

RHODE ISLAND COMPREHENSIVE SOLID WASTE MANAGEMENT PLAN

STATE GUIDE PLAN ELEMENT 171

DRAFT

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RHODE ISLAND RESOURCE RECOVERY
CORPORATION

RHODE ISLAND DEPARTMENT OF
ENVIRONMENTAL MANAGEMENT

RHODE ISLAND STATEWIDE PLANNING PROGRAM

ABSTRACT

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SUBJECT: Management and disposal of solid waste

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ABSTRACT: This plan updates the Solid Waste Management Plan of 1996. It is intended to guide activities of the Rhode Island Resource Recovery Corporation and the Department of Environmental Management. As an element of the State Guide Plan, it sets forth goals, objectives, and policies that must be reflected in future updates of municipal comprehensive plans. It also serves to meet the need for a solid waste management plan as required by the Federal Resource Conservation and Recovery Act of 1976. This plan describes existing practices, programs, and activities in all major solid waste management areas and develops recommendations specific to each area.

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PREFACE

Solid waste management is a multifaceted operation that in Rhode Island includes:

- Waste prevention programs;
- Recycling programs, which include market development programs, composting programs, and materials recovery;
- The disposal of household hazardous waste;
- The Central Landfill in Johnston.

The major component of solid waste management is disposal at the Central Landfill. The disposal capacity of the Landfill is a valuable, important, and limited resource to the state. The RIRRC is the custodian of this asset and has been given the responsibility under the law to manage the asset on behalf of the state in a manner that maximizes the value of the resource over the entire life of the landfill while protecting the public health and the environment. Rhode Island General Law 23-19-1.1 declares that:

The Rhode Island Resource Recovery Corporation shall provide the utmost in protection of public health and the environment while working towards having no impacts on the quality of life in the surrounding neighborhoods. The corporation shall set an example of being a good neighbor by minimizing the impacts of its operations on the surrounding community while setting high industry standards for recycling and waste disposal. The corporation shall seek the best mix of public and private processing, recycling and disposal systems, programs, and facilities for both commercial and municipal waste to meet Rhode Island's needs.

The Central Landfill is critically important to Rhode Island municipalities. Thirty-eight of our thirty-nine cities and towns dispose of all of their solid waste at the Landfill, either through materials recovery (recycling) or burial. On average, about 80 percent of municipal solid waste is landfilled. Even under the most optimistic assumptions about waste diversion, a majority of solid waste will be landfilled for the foreseeable future. While expansion of the Landfill is proposed in this Plan, it will come at some cost. Furthermore, space at the Central Landfill is limited and even with expansion could reach its full capacity within twenty years.

Once the available capacity has been used, Rhode Island will be faced with a choice of siting and developing an entirely new landfill, exporting its solid waste out of state, or siting and developing another type of waste disposal facility such as incineration (which is currently illegal in the state). All of these alternatives are more expensive than the current system and the siting of a new landfill or other disposal facility may not even be feasible. In this context, the remaining capacity of the Central Landfill is a resource that Rhode Island must use very judiciously.

It is important to realize that the state has already made choices about the lifespan of the Central Landfill. Some of those choices have been planned such as setting commercial waste disposal fees lower than those fees charged in other states. While this has benefited Rhode Island businesses and provided income for the State, it has also meant a more rapid depletion

of landfill space and despite laws designed to prevent it, raised the likelihood that some out of state commercial waste is disposed of at the Landfill. Others choices have been defacto choices generally made due to budgetary limitations. Notable is the failure to meet the 1996 municipal recycling goals due largely by the inability to invest sufficiently in programs to promote and assist in municipal recycling. Another notable example is the failure to develop and enforce aggressive programs for commercial recycling, again largely due to underfunding.

How long do we want the Landfill to last? Should the Landfill be prioritized for municipal waste? How much are we willing to pay and invest? These are some of the critical questions that will be examined in this plan. If the state wants to maximize the life of the Landfill then it must increase municipal diversion from burial to prevention and recycling. An even bigger factor in extending the life of the Landfill for municipal use is reducing the commercial solid waste being landfilled. At a minimum, commercial recycling must be expanded but increasing commercial tipping fees could be even more effective. It is a matter of priorities and choices.

171-1 INTRODUCTION

1-1 PURPOSE

The purpose of the Rhode Island Comprehensive Solid Waste Management Plan (“Plan”) is to serve as the guidance document for three separate but related programs. Firstly, the Plan is the long-range policy and program guidance document of the Rhode Island Resource Recovery Corporation (RIRRC) and the Rhode Island Department of Environmental Management (DEM). In addition, Appendix A supersedes RIRRC’s Statewide Resource Recovery System Development Plan (SDP), adopted in 1996. The SDP will be updated by the RIRRC on an annual basis consistent with the format outlined in Appendix A. See Appendix A for the purposes of the SDP.

Secondly, the Plan serves as the solid waste management element of the State Guide Plan, developed in cooperation with the Statewide Planning Program (SPP), whose staff served on the Working Group created by the RIRRC and the DEM to guide its development.

The State Guide Plan, which is promulgated under the jurisdiction of the State Planning Council (SPC), is the basic guide for long-term physical, economic, and social development of the state and serves as a means for centralizing and integrating long-range goals, policies, plans, and facilities.

Thirdly, the Plan updates the Solid Waste Management Plan prepared in 1981 by the DEM in accordance with Section 4002(b) of the Federal Resource Conservation and Recovery Act of 1976 (RCRA). RCRA establishes programs for federal and state regulation of the management of solid and hazardous waste. Therefore, the Plan is also intended to guide activities of the DEM and to meet the need for a state solid waste management plan as required by the RCRA.

The Plan is intended to be an integrated, statewide, comprehensive management plan based on the principles that 1) solid waste management and disposal should be environmentally sound and protective of natural and public resources affected by solid waste management activities; 2) solid waste management and disposal should promote the convenience, health, comfort, safety, and welfare of the people of the state; and 3) the management plan should make the most effective and efficient utilization of licensed landfill capacity and should extend the life of Rhode Island’s Central Landfill (the Landfill) for as long as practicable and feasible.

This Plan will:

- identify the management needs related to specific wastes and recommend waste-specific management programs, on a waste-by-waste basis, to address those needs.
- identify economically feasible strategies to reduce the generation of solid waste and to maximize the diversion of material from ultimate disposal by recycling or re-use of recovered resources;
- identify policies that recommend programs and facilities to meet identified needs

for the management of specific wastes according to the hierarchy of solid waste management methods adopted by the RI Department of Environmental Management and the US Environmental Protection Agency. The Solid Waste Management Hierarchy is defined in Section 1-3, Glossary of Terms;

- provide a framework to identify the type, and project the need for, additional solid waste management facilities;
- guide the siting of future landfill areas and other solid waste management facilities;
- assess the effectiveness of all management programs;
- address incentives for generators, handlers, and managers of solid waste;
- guide the fee-setting process.

In addition to setting a solid waste management goal, objectives, and supporting policies, the Plan describes existing solid waste management practices and provides findings for each area of management. Actions are developed from the findings. One important set of actions include the adoption of unit based pricing of residential solid waste by municipalities. Such pricing programs force the residential generator to pay a disposal fee based on the amount of waste being disposed of. This Plan also recommends that the Corporation reduce the amount of subsidized waste allocated to each municipality, known as the “municipal cap”, in order to be consistent with the municipal sector diversion goals of the Plan. The alignment of the cap with diversion goals will effectively increase the marginal disposal cost for those municipalities that do not achieve the municipal waste diversion goals, and thereby increase the incentive for municipal solid waste managers to improve waste reduction and recycling programs. Incentives targeting commercial sector waste are also examined such as the waving of certain tip fees for recyclable materials and increasing disposal fees for non-segregated commercial sector waste.

The Plan also, in Part 5, provides carefully calculated projections of quantities of solid waste generated, disposed, and recycled.

1-2 ~~RECENT HISTORY OF~~ SOLID WASTE MANAGEMENT IN RHODE ISLAND SINCE 1996: ASSESSING OUR SUCCESSES AND FAILURES

Since publication of the 1996 Plan, significant changes in solid waste management have been implemented which are addressed in detail below.

The Plan, the SDP, and state law stipulate that waste prevention and recycling must be the solid waste management methods of highest priority. By 1996, all Rhode Island municipalities had implemented mandatory recycling programs, with 36 municipalities representing 96 percent of the state’s population delivering all of their collected recyclables

to the RIRRC's Materials Recycling Facility (MRF).¹ In 1996, the basic municipal recycling program diverted about 11 percent of the statewide municipal waste stream from landfilling.

In 1997, RIRRC launched the Maximum Recycling Program which expanded the number of recyclables and had a target of diverting 40 percent of the municipal waste stream from disposal. Full statewide implementation was completed in 2002 and is currently diverting approximately 14 percent, not including leaf and yard waste. If the diversion of leaf and yard waste, white goods, and tires from disposal is included, the overall diversion rate is approximately 21.5 percent.

Solid waste disposal in Rhode Island has been largely a function of state government for nearly a quarter of a century. About 99.2 percent of Rhode Island's municipal solid waste and in 2005, an estimated 100 percent of the commercial solid waste streams were disposed at the Landfill owned and operated by the RIRRC in Johnston.

Between 1989 and 1994, 50-70 percent of Rhode Island's commercial sector waste was disposed of in facilities in Maine, Massachusetts, and New Hampshire, drawn by the low tipping fees that resulted from a surplus in disposal capacity. Beginning in mid-1994, the regional waste disposal markets tightened, driving out-of-state tip fees up while the Landfill's tip fees remained stable. The principal events that drove Rhode Island-generated waste from disposal sites in Massachusetts and other states to the Landfill were: 1) closure of the 1,500 tons per day (TPD) landfill in East Bridgewater in February 1997; 2) the imposition of restrictions on the BFI landfill in Fall River in January 1998; and 3) closure of the 2,000 TPD Plainville landfill in March 1998. As a result, all or virtually all of Rhode Island's commercial waste is once again being disposed of at the Landfill.

Indeed, the low commercial waste tipping fees in Rhode Island compared to the elevated tipping fees in Massachusetts resulted in a flight of Massachusetts solid waste to the Landfill in the spring and summer of 1998. The flood of Massachusetts solid waste was stanchied by September 1998 as a result of lawsuits by the DEM and RIRRC against the principal transporters of the waste. The litigation concluded with consent orders according to which the largest haulers who signed them stipulated they would no longer deliver out-of-state waste to the Landfill and the following simple analysis is sufficient to confirm that the flow of out-of-state waste into the Landfill has been largely curtailed. As of 2005, 1,170,000 tons of waste was disposed in the Landfill, generated from a population of about 1,060,000. In addition, approximately 148,000 tons of municipal solid waste were recycled or composted, yielding an estimated statewide MSW generation rate of 1.24 tons of solid waste per capita per year, lower than BioCycle's² estimated national waste generation rate of 1.31 tons per capita per year.

As a result of the drastic decrease in Rhode Island commercial sector waste exports described

¹ South Kingstown and Narragansett cooperate in a joint program in which their residents source separate recyclables, some of which are delivered to the MRF. New Shoreham, because of its unique circumstances, conducts a source separation program under which recovered recyclables are processed and marketed directly by the Town.

² *BioCycle*, Vol. 45.1, January '04, page 35 Table 3.

above and the failure to achieve the waste diversion goals--a 48.6 percent overall recycling rate--the 1996 Plan significantly underestimated the solid waste disposal projected for 2005. The 1996 Plan projected approximately 613,000 tons to be landfilled in 2005 as compared to 1,170,000 tons of waste actually landfilled. Consequently, the projected life of the Central Landfill through Phase V was overestimated by almost 10 years.

The failure to achieve the Plan's stated diversion goals can be attributed to the lack of incentive based waste diversion mechanisms as well as the failure to implement many of the Plan's recommendations. The inability to fully implement many of the recommendations can be attributed to a lack of funding and the commitment of staff resources. Some of the recommendations of the 1996 Plan that were not put into effect include:

- stable funding for waste reduction programs;
- development of a waste reduction task force;
- implementation of model waste reduction projects with industries;
- implementation of user fee based residential waste collection programs;
- evaluation of the costs of residential recycling and collection, and, exploration of alternative financing for municipal recycling programs;
- revision of the municipal rate structure to reflect the true cost of waste disposal;
- implementation of an on-going business recycling education program;
- studying the feasibility of commercial recycling collection programs;
- developing small business assistance grants for recycling;
- enforcement of commercial recycling regulations;
- revision of the commercial recycling reporting system;
- implementation of a comprehensive State Agency recycling program;
- enforcement and promotion of recycling by multi-family housing;
- enforcement of school recycling;
- study of the potential to reduce construction and demolition waste.

While this Plan cannot mandate funding for these waste diversion programs, it can be stated with confidence that continued failure to adequately fund and staff the programs and activities recommended in this Plan will shorten the projected life of the Central Landfill proposed Phase VI from approximately 26 to 19 years.

The principal solid waste management achievements attained since the 1996 Plan are:

- The Charlestown and Bristol sanitary landfills and the construction/demolition debris landfill operated by Hometown Properties, Inc. on Dry Bridge Road in North Kingstown have closed, leaving the Landfill and the Tiverton Municipal Landfill as the only solid waste disposal facilities in Rhode Island.
- In 1996, RIRRC and Johnston entered into an agreement that will remain in effect

for as long as RIRRC operates a facility in Johnston. The agreement prohibits landfill expansion to the north and west, but permits expansion to the south. It provides that the Town will assist RIRRC to site and develop landfill expansion areas. It also provides that RIRRC and the Town will cooperate in improving access to the Landfill and in developing an industrial park. RIRRC has paid Johnston more than 25 million dollars in lieu of taxes.

- The quantity of all materials extracted from the municipal waste stream, diverted from the Landfill, and recycled by RIRRC, increased by about 150 percent from 57,488 tons in 1996 to 145,663 tons in 2005. These figures include leaf and yard waste, white goods, and tires, recycled by RIRRC but not materials recycled outside the RIRRC system.
- In 1996, the production capacity of the MRF was doubled by expanding its processing footprint from about 40,000 square feet to about 72,000 square feet and the quantity of recyclables handled by the MRF from about 53,000 tons in 1996 to more than 91,000 tons in 2005.
- The Phase I relocation of Cedar Swamp Brook was completed in 1998 thereby permitting construction of Phase IV of the Landfill.
- A 300,000 gallon-per-day facility which treats the leachate from the lined portion of the Landfill was brought into operation in 1999.
- Phase IV of the Landfill, the so-called Southwest Landfill, went into operation in 2000 with 3.72 million tons or three and one half years of capacity. This was the first increment of Landfill expansion to be licensed since the publication of the Plan in 1996. In 2000, the final cap was installed over 37 acres of Phase I of the Landfill that had been closed under a consent decree between RIRRC and EPA, with the 54 remaining uncapped acres of the closed Phase I of the Landfill completed in 2005. Construction of Areas 1 and 2 (22 acres each) of Phase IV of the Landfill baseliner and leachate collection system was also completed in 2000.
- In 2000, RIRRC began grinding more than 80,000 tons of construction and demolition debris (C&D) annually for re-use as alternative landfill daily cover material.
- Construction of Area 3 (11 acres) of Phase IV of the Landfill baseliner and leachate collection system was completed in 2001.
- In 2001, RIRRC assumed from the DEM responsibility for disposing of household hazardous waste. The Eco Depot, a permanent household hazardous waste collection and transfer facility was brought into operation in July, 2001 at RIRRC's complex and has since collected and disposed of about 934 tons of household hazardous waste at a total cost to RIRRC of more than \$1,260,000 including construction, operating, and disposal expenses.
- RIRRC has established a permanent Computer Recycling Program. A total of 1,573,000 pounds of computers and other electronic waste have been collected and recycled through June 2006 at a total cost to RIRRC of \$294,000, with \$126,000 paid to RIRRC's contractor to remove and recycle the computers and \$168,000 spent to advertise each of the collection events to ensure the public is aware of

them and fully utilizes them. Various valuable metals, including lead, mercury, and cadmium are stripped from the recovered electronic components.

- The Central Landfill Tipping Facility was brought on line in 2002 at a total cost for the building and its equipment of more than \$18,000,000. Trash trucks dump their loads on the floor of the 57,500 square foot facility rather than at the Landfill. As a result, Landfill waste compaction and capacity utilization have improved and the Landfill is a much safer workplace. The facility gives RIRRC the capability to remove wood, metal, and corrugated cardboard from the commercial waste stream for recycling, as well as other items such as vehicle batteries.
- In 2002, construction of Area 4 (11 acres) of Phase IV of the Landfill baseliner and leachate collection system was completed.
- RIRRC funded the design and construction of a set of ramps at Rte. I-295 and Scituate Avenue and also the upgrading of Scituate Avenue to a four-lane road from I-295 to the Landfill in order to provide a short, fast, direct link from the interstate highway to the Landfill. The ramps and the upgraded access road opened in 2004.
- Phase V of the Landfill was licensed in 2004 with a capacity of 7.57 million tons.
- Development of the Industrial Park under the RIRRC-Johnston Host Community Agreement began in 2005.

1-3 GLOSSARY OF TERMS AND ACRONYMS

Aerobic Decomposition A type of decomposition of organic wastes requiring the presence of oxygen, making possible conversion of material to compost.

Alternate Daily Cover Any material acceptable to the DEM for use as either daily or intermediate landfill cover. Examples include crushed C&D, screened street sweepings, sludge and tire incinerator ash, foundry sand, and others.

Amber Glass Brown glass.

Bulky Waste Large items of solid waste such as appliances, furniture, auto parts, stumps, etc.

C&D Construction & Demolition Debris.

Cell A sanitary landfill section in which compacted solid wastes are enclosed by natural soil or cover material.

Commercial Solid Waste (CSW) Solid waste generated by businesses and institutions. CSW includes residential waste generated in apartment and condominium buildings where the waste is collected by a trash hauler who is contracted to the building manager directly.

Composting The biological decomposition of solid organic materials (e.g., yard waste, food scraps, paper) by microorganisms (mainly bacteria and fungi) into “compost” or a humus soil-like material.

Composting Facility A facility used to provide aerobic, thermophilic decomposition of solid organic constituents of solid waste to produce a stable, humus-like material of commercial marketable quality.

Construction & Demolition Debris (C&D) Waste building materials resulting from construction, remodeling or repairing structures or waste generated from the razing of structures.

Construction and Demolition Debris Processing Facility A facility that processes construction and demolition debris by any means, for the purpose of recovering recyclables and marketing them for value.

Cover Material Clean soil, earth or other material approved by the DEM used to cover compacted solid waste in a sanitary landfill.

CSW Commercial Solid Waste.

DEM Rhode Island Department of Environmental Management.

Diversion Rate The total amount (reflected as a percentage) of material, diverted from disposal through waste prevention, recycling, or re-use. The diversion rate is calculated as follows: the amount of material diverted divided by total potential generation. The amount of material diverted *must* be included in both the numerator and the denominator.

Drop-Off Center A facility usually provided by a municipality for its residents as a collection point for recyclable materials.

Electronics Computers and computer peripherals, including, but not limited to: monitors, laptops, central processing units, printers, modems, keyboards, mice; televisions and television peripherals, including, but not limited to, cable or satellite receivers, VCR's, DVD players, and electronic games, applicable to all items regardless of point of generation.

Flint Glass Clear glass.

Geomembrane. An impermeable membrane used with foundation, soil, rock, clay, gravel, or any other geotechnical engineering-related material as an integral part of either (1) a landfill base liner structure or system designed to limit the movement of leachate into groundwater; or (2) a landfill final cap system or structure designed to limit the penetration of surface water into the landfill or the escape of gas from the landfill.

Glass Cullet

Groundwater Water found underground which completely fills the open spaces between particles of sediment and within rock formations.

HDPE High Density Polyethylene, a plastic resin used to make milk jugs, detergent containers, and other containers; designated by a "2" inside of a triangle.

Hazardous Waste Wastes that are dangerous because they have one or more of the

following characteristics: (1) toxicity, (2) explosiveness/flammability, (3) corrosiveness, (4) infectiousness, or (5) radioactivity, as defined in accordance with Section 23-19.1-4 of the Rhode Island General Laws (RIGL), and regulations adopted pursuant thereto.

Household Hazardous Waste (HHW) Waste materials from consumer products containing hazardous substances that are used and disposed of in the municipal waste stream by residents rather than by business or industry and which have one or more characteristics of hazardous waste (see above).

Integrated Waste Management The use of a combination of waste management techniques that ranks the preferred methods in the following order: waste prevention, reuse, recycling and composting, incineration, and landfilling.

Kraft Paper A coarse brownish paper noted for its strength, often used in shopping bags and large envelopes.

Landfill (Sanitary Landfill) An engineered, licensed facility for the land disposal of solid waste by spreading the waste in thin layers, compacting it to the smallest practical volume and covering it daily with earth or other materials that minimizes environmental impacts and that includes (1) baseliner, (2) leachate collection, (3) landfill gas collection and extraction, and (4) final cap systems and further that complies with State and Federal design and operational requirements.

Landfill Gas Gas consisting of methane (45-55%), carbon dioxide (45-55%), nitrogen (2-5%), oxygen and ammonia (up to about 1% each) and trace amounts of other constituents that is generated by the decomposition of solid waste in sanitary landfills.

Landfill Gas Recovery Facility A facility in which landfill gases are collected to control gas migration and for the recovery of energy.

Leachate A contaminated liquid that has percolated through, or originated in, solid waste in a landfill and contains dissolved or suspended materials from solid waste.

Liner System A continuous layer of natural and human-made materials beneath or on the sides of a landfill or landfill cell, which restricts the downward or lateral escape of solid waste, any constituents of such wastes, or leachate and that complies with the DEM regulations.

Materials Recovery Facility (MRF) A facility that accepts mixed recyclables extracted from the residential waste stream and mechanically separates and processes them to market specifications for sale to brokers, manufacturers, or other market outlets.

Maximum Recycling Program Rhode Island's expanded recycling program that targets 40% of the residential waste stream. Materials included in the program are: glass containers, tinned steel cans, aluminum cans, foil, and pie plates, "No.2" HDPE plastic milk/water jugs, "No.1" PET soda bottles; newspapers, brown paper grocery bags, writing paper, mail, magazines, catalogs, paperboard (such as cereal boxes), corrugated cardboard, telephone directories, scrap metals, milk cartons and juice boxes, colored HDPE plastic bottles (such as

“No.2” detergent bottles), custom PET (all other “No.1” plastic containers), and empty aerosol and paint cans.

Mixed Paper Waste paper of various kinds and quality.

Mixed Recyclables Those recyclable materials which are removed from municipal solid waste at the source and transported to the MRF for recycling.

MRF Materials Recovery Facility.

MRF Recycling Rate The amount of material (expressed as a percentage) that is delivered to the MRF and thereby diverted from landfilling. The MRF Recycling Rate for a municipality is calculated by dividing the amount of material delivered to the MRF by the sum of waste delivered to the landfill plus material delivered to the MRF.

MSW Municipal Solid Waste.

Municipal Cap The amount of solid waste allocated to each municipality on an annual basis which is eligible for disposal at the municipal rate as set forth in RIGL § 23-19-13.g(2). Each municipality’s annual cap is based on statewide waste generation, population, and adjusted to account for recycling goals.

Municipal Solid Waste (MSW) In Rhode Island, this term applies only to residentially-generated solid waste the collection or disposal of which is provided for by the municipality. Residential solid waste generated in condominiums or apartment buildings the collection of which is not provided by the municipality is classified as “Commercial Solid Waste”. Other states, EPA, and the solid waste industry nationally, apply the term “MSW” to the combined categories of material classified in Rhode Island as “MSW” and “CSW”.

OCC Old Corrugated Cardboard.

PVC (Polyvinyl Chloride) A plastic used for some cooking oil containers, water bottles, film wrapping for meat packaging, car care products, etc.

Paperboard Paper that is thicker, heavier, and more rigid than other papers; typically used in cereal boxes.

PET Polyethylene Terephthalate, a plastic resin used to make soft drink, mineral water, and other containers; designated by a “1” inside of a triangle.

Pollutant Any dredged material, solid waste, incinerator residue, sewage, garbage, sewage sludge, sediment, munitions, chemical wastes, septage, biological materials, radioactive materials, heat, wrecked or discarded equipment, cellar dirt, industrial, municipal, or agricultural waste or effluent, petroleum or petroleum products including but not limited to oil; or any material which may alter the aesthetic, chemical, physical, biological, thermal, or radiological characteristics and/or integrity of water, which may include rock and sand.

RCRA Federal Resource Conservation and Recovery Act of 1976

Recycling The process by which materials otherwise destined for disposal are collected, reprocessed, reused, or remanufactured.

Recyclable Materials Those materials separated from municipal solid waste for recycling as listed in the Rhode Island commercial or municipal recycling regulations or the Rhode Island Battery Deposit and Control Regulations, or oil subject to the hard-to-dispose-of tax as stated in Chapter 37-15.1 of the Rhode Island General Laws. The materials to be included may change from time to time depending upon new technologies, economic conditions, waste stream characteristics, environmental effects, or mutual agreement between the State and municipalities.

Resin The raw material from which plastic products are made.

RIRRC [Rhode Island Resource Recovery Corporation.](#)

SDP [Statewide Resource Recovery System Development Plan.](#)

SPP [Statewide Planning Program.](#)

Segregated Solid Waste The useful materials that have been separated from the waste stream at the point of generation for the purpose of recovering and recycling these materials.

Septic Waste Any solid, liquid, or semi-solid waste removed from septic tanks or cesspools, lagoons, trucks, or other sources.

Sewage Sludge A semi-liquid substance consisting of settled sewage solids combined with water and dissolved materials in varying amounts.

Solid Waste Garbage, refuse, and other discarded solid materials generated by residential, institutional, commercial, industrial, and agricultural sources but does not include solids or dissolved material in domestic sewage or sewage sludge, nor does it include hazardous waste as defined in the Rhode Island Hazardous Waste Management Act, RIGL Chapter 23-19.1. For purposes of these rules, solid waste shall also include non-hazardous liquid, semi-solid, and containerized gaseous wastes, subject to any special conditions contained in these rules.

Solid Waste Management Facility Any plant, structure, equipment, real and personal property, except mobile equipment or incinerators with a capacity of less than one thousand (1,000) pounds per hour, owned or operated for the purpose of processing, treating, or disposing of solid waste.

Solid Waste Management Hierarchy The ordering of priorities as specified in Section 23-19-3 of the Rhode Island General Laws which states, “An integrated approach shall be adopted with respect to solid waste management planning and implementation activities that shall be based on the following priorities to the extent economically feasible: (i) Reduction of the amount of source waste generated; (ii) Source separation and recycling; (iii) Waste processing such as recycling based technology to reduce the volume of waste necessary for land disposal; (iv) Land disposal.” A similar management hierarchy is also required by federal law.

Source Separation In the context of the Municipal Recycling Program, removal by the household of recyclable materials from its waste, placement of such recyclables in and on the set-out container provided by the State, and conveyance of the container to the curbside or other designated location for collection by the municipality or its agents.

SPC State Planning Council.

Tipping Fee Price charged for delivering solid waste or recyclables to the Landfill or MRF, respectively, usually in dollars per ton.

TPD Tons Per Day.

Transfer Station A licensed facility at which solid waste is transferred from collection vehicles to larger trucks or rail cars for longer distance transport.

Waste Management Actions taken to effectuate the receipt, storage, transportation, processing for resource recovery, recycling, and/or the ultimate disposal of solid waste.

Waste Prevention The design, manufacture, purchase, or use of materials or products (including packages) to reduce their amount or toxicity before they enter the solid waste stream. The term “waste prevention” is used here in lieu of “source reduction”. (“Waste prevention” is defined as “source reduction” in the RI General Laws.)

White Goods Large metal household appliances, including but not limited to stoves, washers, refrigerators, and dryers.

Wood Waste Lumber, pallets, crates, plywood, particle board, and saw dust, substantially free of contaminants. Contaminants include: lead paint, banding, bolts over 1¼ inch diameter, shingles, pipe, Formica, plastics, and preservatives.

1-4 ADOPTION

This Plan was adopted by:

the RIRRC’s Board of Commissioners pursuant to Section 23-19-4(b) of the Rhode Island General Laws on December 6, 2005.

This Plan was adopted by the Department of Environmental Management pursuant to Subtitle D Section 23-19 (6) of the Rhode Island General Laws on _____

the SPC, as Element 171 of the State Guide Plan, on _____

171-2 GOAL, OBJECTIVES, AND POLICIES

2-1 INTRODUCTION

~~A purpose of t~~This Plan ~~is to~~ provides a framework for solid waste management decision-making ~~that includes within its context the state's based on solid waste policies as set forth in State laws, regulations, and other plans, and to update state goals, objectives, and policies as a framework for managing solid waste in Rhode Island.~~ The following goal, objectives, and policies provide the basis for managing solid waste in Rhode Island as expressed in ~~for~~ the Plan's action items and for guiding the actions of other state, local, and private programs. Another purpose of this Plan is to provide guidance to decision-makers concerning ~~how to~~ allocation of resources needed ~~to each management option for the achievement of the Plan's~~ goal and objectives.

Development of goals and objectives begins with an examination of the ones in force at the time the Plan was prepared. State policies and objectives for solid waste management are set out principally in state legislation. These are then expanded, clarified, and supplemented in plans and regulations that implement state and federal statutes and requirements.

Accordingly, this Part is based on major state and federal legislative and regulatory policies, supplemented by goals, objectives, and policies from relevant state plans. The principal sources were the state's solid waste enabling legislation, the Rules and Regulations for Solid Waste Management Facilities issued by DEM, the 1996 Plan, the 1981 Rhode Island Solid Waste Management Plan, the 1987 Rhode Island Statewide Resource Recovery System Development Plan, and the federal Resource Conservation and Recovery Act (RCRA) and related regulations.

2-2 DEFINITION OF TERMS

The goal, objectives, and policies establish the intent of a plan. They are supported by legislation, are translated into actions for specific implementation measures, and are used to guide program direction, administration, and implementation activities (e.g., negotiating legislation, development of regulations, or preparation of functional plans).

Typically in planning as well as in management, goals, objectives, and policies are used in a hierarchy:

- Goal: The end or ideal that is desired. It is a state or value toward which an effort is directed even though it may not be perfectly attainable. Goal statements are broad in scope, long-term in nature but should not be vague.
- Objective: Like a goal, an objective is an end toward which an effort is directed. An objective, however, should be *measurable* and *attainable*. Objectives are stated in more narrow and specific terms than goals and may be set within definite time periods and establish performance measures.
- Policies are intended to guide decisions and courses of action toward

implementing a plan. Policies are not an endpoint but set forth the acceptable and recommended procedures for attaining goals and objectives.

This Plan also contains specific recommended actions intended to further the advancement toward its goal and objectives.

For the purposes of this Plan, these terms will be used as defined above, although in law they may be used interchangeably. For example, the declaration of policy in legislation, while intended to provide guidance in implementation, may contain broad, general goal statements, as well as specific policies.

~~2-3~~ GOAL, OBJECTIVES, AND POLICIES^[K1]

~~Development of goals and objectives begins with an examination of the ones in force at the time the Plan was prepared. State policies and objectives for solid waste management are set out principally in state legislation. These are then expanded, clarified, and supplemented in plans and regulations which implement state and federal statutes and requirements.~~

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2-42-3 GOAL FOR THE MANAGEMENT OF SOLID WASTE IN RHODE ISLAND

Environmentally sound management of solid waste that protects and preserves the environment and public resources, maximizes the useful life of Central Landfill, and promotes the convenience, health, comfort, safety, and welfare of the people of the state at reasonable cost including, in order of preference, 1) waste prevention, 2) source separation and recycling, and 3) processing and disposal.

2-52-4 OBJECTIVES AND POLICIES FOR SOLID WASTE MANAGEMENT IN RHODE ISLAND

The following presents a framework of objectives and associated policies for solid waste management in Rhode Island to provide guidance in planning and management of the various wastes covered in the Plan. In most cases, they reflect and/or complement established legislative goals.

OBJECTIVE 1: REDUCE THE AMOUNT OF SOLID WASTE GENERATED.

Policies include:

- A. Encourage industrial processes that generate smaller amounts of wastes.
- B. Maximize resource conservation to the extent economically feasible.
- C. Provide incentives for residents and the public and private sectors to reduce waste.
- D. Educate consumers regarding the impact of purchases on waste prevention.
- E. Support implementation of Pay-As-You-Throw (PAYT) systems.
- F. Provide technical assistance or referrals to maximize waste prevention and recycling.
- G. Plan waste management components in mandated hierarchical priority order.

OBJECTIVE 2: MAXIMIZE RECOVERY OF POST CONSUMER MATERIALS FOR REUSE IN THE MANUFACTURE OF NEW PRODUCTS.

Policies include:

- A. Expand recycling and reuse in the most efficient and cost-effective manner possible and promote the beneficial reuse of materials.
- B. Educate consumers regarding materials recovery and encourage purchase of recycled content products, and products with reduced toxicity and packaging.
- C. Work with state, national, and regional organizations and other states to develop markets for recyclables and recycled content products.
- D. Ensure that adequate MRF capacity remains available to process all municipal recyclables.
- E. Facilitate and encourage State and private procurement of recycled goods.
- F. Promote research and development into recycling processes and technologies.

OBJECTIVE 3: PROVIDE FOR NECESSARY AND RELIABLE SOLID WASTE MANAGEMENT FACILITIES AND PROGRAMS.

Policies include:

- A. Provide adequate materials recovery facility capacity, either directly or through a private company.
- B. Develop only facilities and services essential to serve Rhode Island's citizens and businesses and only after conducting feasibility and cost-benefit analyses.
- C. Encourage private industry to continue to play a key role in the state's solid waste management programs.

OBJECTIVE 4: OPTIMIZE THE UTILIZATION OF CENTRAL LANDFILL CAPACITY IN ORDER TO MAXIMIZE LANDFILL LIFE.

Policies include:

- A. Utilize compaction methods that daily maximize the density of solid waste disposed.
- B. Utilize daily and intermediate landfill cover methods and technologies that minimize consumption of landfill airspace by cover materials.
- C. Ensure that landfill operations optimize airspace utilization.
- D. Consider all costs associated with the landfill when setting disposal fees, making certain that fees cover all costs.

OBJECTIVE 5: PROVIDE MAXIMUM PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT.

Policies include:

- A. Conduct solid waste management activities in an environmentally sound manner.
- B. Minimize landfilling.
- C. Remove toxins from the waste stream, and prevent their leaching into the environment during processing and disposal, to the extent feasible.
- D. Consider, when facility siting, the environmental impacts related to transportation, including fuel consumption and vehicle emissions on air quality and transportation system loading.
- E. Ensure that solid waste management facilities are operated in a safe manner, in compliance with all applicable rules and regulations.

OBJECTIVE 6: MAINTAIN REASONABLE COSTS.

Policies include:

- A. Develop a comprehensive, integrated, cost-effective, and innovative solid waste management system for Rhode Island by providing incentives and processes for preserving landfill space and lowering costs.
- B. Perform comparative cost analyses on a per-ton basis in order to ensure that RIRRC procures the most cost-effective facilities and programs.

171-3 BACKGROUND FOR PLANNING

3-1 INTRODUCTION

The needs and problems of waste management in Rhode Island are a function of the character of the state: its development patterns, natural resources, economy, and social and political features. For example, in this, the second most densely populated state in the United States, it is difficult to find sites for solid waste disposal facilities that are not in somebody's backyard. Moreover, widespread surface water and shallow groundwater resources and Rhode Island's geological characteristics serve to further severely restrict the siting of solid waste landfills. On the other hand, as the smallest state ~~in land area and~~ with an extensive highway network, Rhode Island has the basis for a relatively efficient, centralized system of facilities.

Population growth or redistribution, industrial growth and types of industry, availability of land and utilities, income and related planning and investment decisions are basic considerations in waste management. These issues are covered in depth in the land use element and other elements of the State Guide Plan. The following is a brief summary of key elements which present a background for waste management planning.

3-2 PROFILE OF THE STATE

Rhode Island is the smallest state, with a net land surface of approximately 658,000 acres (excluding inland waters), comparable to the size of the average U.S. county. The state occupies an area of approximately 37 by 48 miles on the heavily urbanized Atlantic seaboard, bordered by Connecticut and Massachusetts.

All the land in Rhode Island is contained in 39 incorporated municipalities; eight cities and 31 towns (see Figure 171-3-1). The state is also subdivided into five counties (Bristol, Kent, Newport, Providence, and Washington) which serve as judicial districts but have no other governmental powers.

3-3 POPULATION

~~3-3-1~~Population distribution

The 2000 population of the state, according to the U.S. Census bureau, was 1,048,319. The distribution of population and population projections by city and town for 2000-2030 is shown on Table 171-3-1 Rhode Island Population Projections by Municipality.

Table 171-3-1 Rhode Island Population Projections by Municipality

Population Projections Rhode Island Cities and Towns by County 2000 - 2030							
City/Town by Cnty	2000	2005	2010	2015	2020	2025	2030
BARRINGTON	16,819	16,909	16,984	17,096	17,222	17,329	17,407
BRISTOL	22,469	22,796	23,068	23,475	23,930	24,319	24,603
WARREN	11,360	11,461	11,544	11,670	11,809	11,929	12,016
BRISTOL COUNTY	50,648	51,165	51,596	52,241	52,961	53,576	54,026
COVENTRY	33,668	34,590	35,357	36,507	37,789	38,886	39,687
EAST GREENWICH	12,948	13,330	13,648	14,125	14,656	15,111	15,443
WARWICK	85,808	85,624	85,472	85,243	84,987	84,769	84,609
WEST GREENWICH	5,085	5,413	5,685	6,094	6,550	6,940	7,225
WEST WARWICK	29,581	29,938	30,235	30,679	31,176	31,600	31,910
KENT COUNTY	167,090	168,895	170,397	172,648	175,159	177,305	178,875
JAMESTOWN	5,622	5,843	6,027	6,302	6,609	6,872	7,064
LITTLE COMPTON	3,593	3,664	3,723	3,811	3,910	3,994	4,056
MIDDLETOWN	17,334	17,350	17,364	17,385	17,408	17,427	17,442
NEWPORT	26,475	26,086	25,763	25,278	24,737	24,275	23,937
PORTSMOUTH	17,149	17,553	17,889	18,392	18,954	19,434	19,785
TIVERTON	15,260	15,502	15,704	16,006	16,342	16,630	16,841
NEWPORT COUNTY	85,433	85,998	86,469	87,174	87,961	88,633	89,125
BURRILLVILLE	15,796	16,163	16,469	16,928	17,439	17,876	18,195
CENTRAL FALLS	18,928	19,198	19,422	19,759	20,135	20,455	20,690
CRANSTON	79,269	80,285	81,131	82,398	83,811	85,019	85,903
CUMBERLAND	31,840	32,506	33,061	33,891	34,818	35,610	36,189
EAST PROVIDENCE	48,688	48,368	48,102	47,703	47,257	46,877	46,599
FOSTER	4,274	4,400	4,505	4,663	4,838	4,988	5,098
GLOCESTER	9,948	10,283	10,561	10,979	11,445	11,843	12,134
JOHNSTON	28,195	28,654	29,036	29,609	30,247	30,793	31,192
LINCOLN	20,898	21,449	21,908	22,596	23,363	24,019	24,498
NORTH PROVIDENCE	32,411	32,861	33,236	33,797	34,423	34,958	35,349
NORTH SMITHFIELD	10,618	10,708	10,783	10,896	11,021	11,128	11,207
PAWTUCKET	72,958	73,203	73,407	73,712	74,053	74,344	74,557
PROVIDENCE	173,618	175,965	177,919	180,847	184,113	186,904	188,946
SCITUATE	10,324	10,592	10,815	11,149	11,522	11,840	12,073
SMITHFIELD	20,613	21,133	21,566	22,215	22,939	23,558	24,011
WOONSOCKET	43,224	42,848	42,536	42,067	41,545	41,098	40,772
PROVIDENCE COUNTY	621,602	628,617	634,458	643,207	652,969	661,312	667,414
CHARLESTOWN	7,859	8,286	8,642	9,174	9,768	10,276	10,648
EXETER	6,045	6,267	6,452	6,729	7,039	7,303	7,496
HOPKINTON	7,836	8,036	8,202	8,451	8,729	8,966	9,140
NARRAGANSETT	16,361	16,957	17,454	18,198	19,028	19,738	20,256
NEW SHOREHAM	1,010	1,064	1,110	1,178	1,253	1,318	1,366
NORTH KINGSTOWN	26,326	26,939	27,449	28,213	29,065	29,793	30,326
RICHMOND	7,222	7,669	8,042	8,599	9,222	9,754	10,143
SOUTH KINGSTOWN	27,921	28,969	29,841	31,148	32,607	33,853	34,765
WESTERLY	22,966	23,578	24,088	24,852	25,704	26,432	26,964
WASHINGTON COUNTY	123,546	127,766	131,279	136,542	142,414	147,433	151,103
STATE TOTALS	1,048,319	1,062,441	1,074,199	1,091,813	1,111,464	1,128,260	1,140,543
Source: U.S. Census Bureau RI Statewide Planning							
							Pop Proj by City&Town by Cnty Table

3-3-2 Geographic movement

While the center of population remains the Providence Metropolitan Area, population growth has been strongest in the area known as South County, which, although it is not an official geographical designation, is an historical name for Washington County plus West Greenwich and East Greenwich. Between 1990 and 2000, South County's population increased by 12.9 percent while the balance of the state increased by only 3.3 percent with seven municipalities actually losing population.

The majority of Rhode Islanders will continue to be urban and suburban dwellers, yet population growth outside the traditional central city and older suburban areas will continue to have a tremendous impact on the lifestyle and resources of previously rural communities. The dispersion of population will heighten facility siting problems by reducing the land available for new waste management facilities and forcing existing facilities to close as a result of conflicts with new uses. This trend is also likely to increase solid waste hauling distances and costs.

The population shift from urban to suburban and rural areas is projected to continue at much the same rate as noted above over the next 20 years as shown in Table 171-3-1. (An exception to this trend is Providence, which experienced a population expansion of eight percent from 1990 to 2000.) The rural and suburban towns south of the state's geographical waist are projected to increase in population by nearly 20 percent by 2025 while the Providence Metropolitan Area of Providence, East Providence, Pawtucket, Central Falls, North Providence, Johnston, Cranston, West Warwick, and Warwick increases by only 4.6 percent.

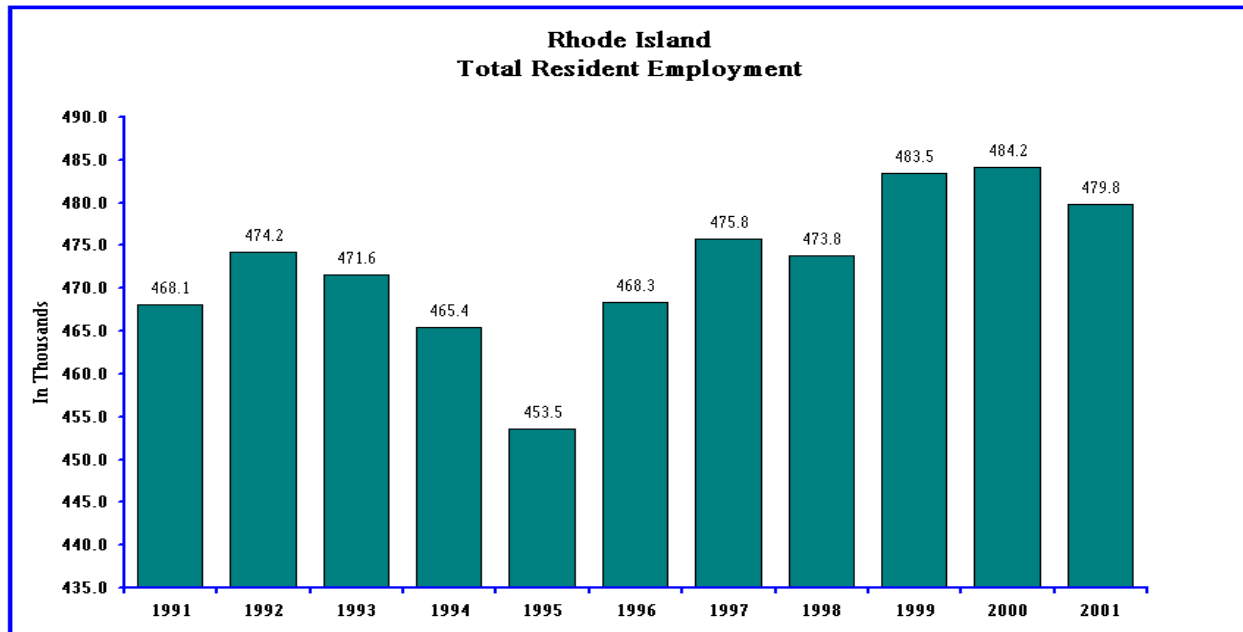
3-4 ECONOMY AND INDUSTRY

3-4-1 Economy

Rhode Island's seven-decades-long transition away from a manufacturing-based economy and toward a service-based economy has continued unabated over the past 10 years to the point where approximately 80 percent of all wages and salaries are now derived from the service-producing sectors of the economy and only about 20 percent from the goods-producing sectors. It is likely that if the continued movement toward a service-based economy has any perceptible impact on solid waste generation in Rhode Island, it will be an increase in the generation of waste papers that can be recycled.

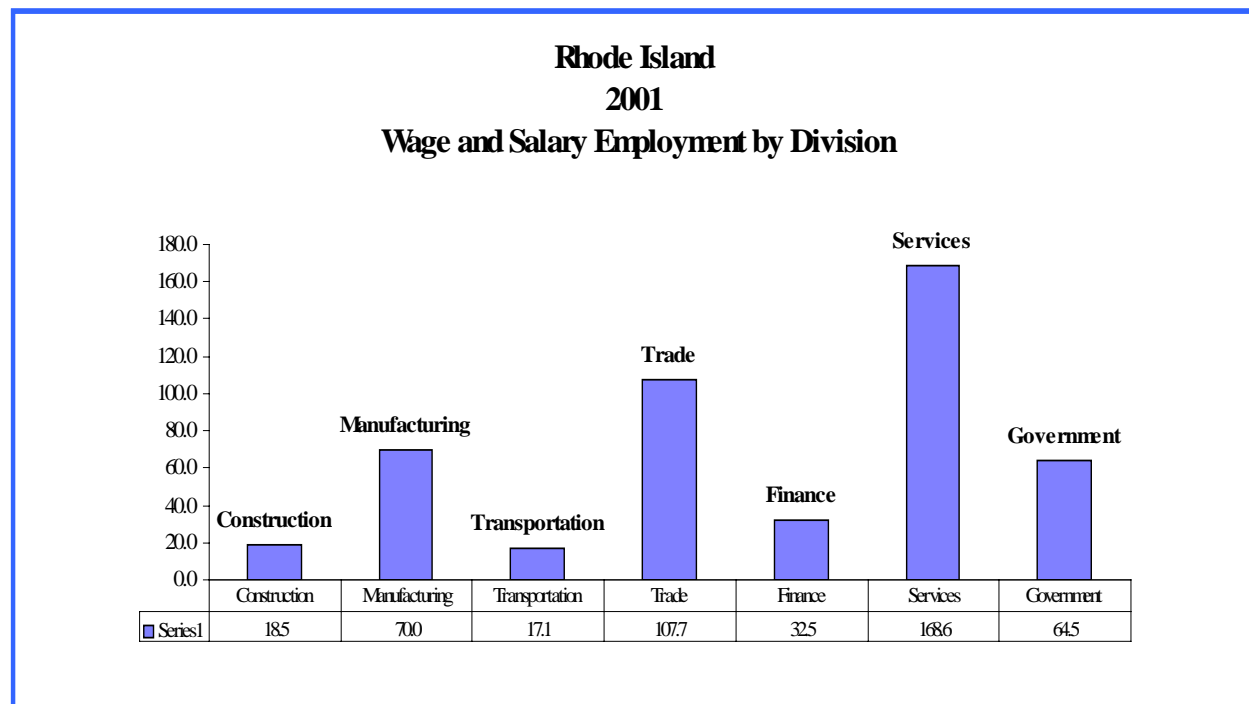
3-4-2 Employment

Total employment in the State of Rhode Island is shown in the accompanying bar graph for each year from 1991 through 2001. Staff at the R.I. Economic Development Corporation indicates that 20-year employment projections are no longer calculated by the state or the federal government.

Figure 171-3-1 Rhode Island Employment 1991 - 2001

3-4-3 Employment categories

The principal employment categories in 2001 are shown in Figure 171-3-2 based on data obtained from the Economic Development Corporation.

Figure 171-3-2 Employment By Category

3-5 POLITICAL SUBDIVISIONS AND OTHER ADMINISTRATIVE UNITS

Most government services in Rhode Island are provided at either the state or municipal levels. Rhode Island's 39 municipalities range widely in character from densely populated central cities to rural, largely wooded areas. These municipalities also vary widely in their capacity to plan and deliver services. In waste management planning, a significant distinction can be made between municipalities that have full-time and those with part-time governments. Regional agencies, counties, and special districts have very limited, specialized roles of little significance for solid waste management.

~~3-5-1 Local government~~

~~Rhode Island's 39 municipalities range widely in character from densely populated central cities to rural, largely wooded areas. These municipalities also vary widely in their capacity to plan and deliver services. In waste management planning, a significant distinction can be made between municipalities that have full-time and those with part-time governments.~~

~~3-5-2 Regional agencies~~

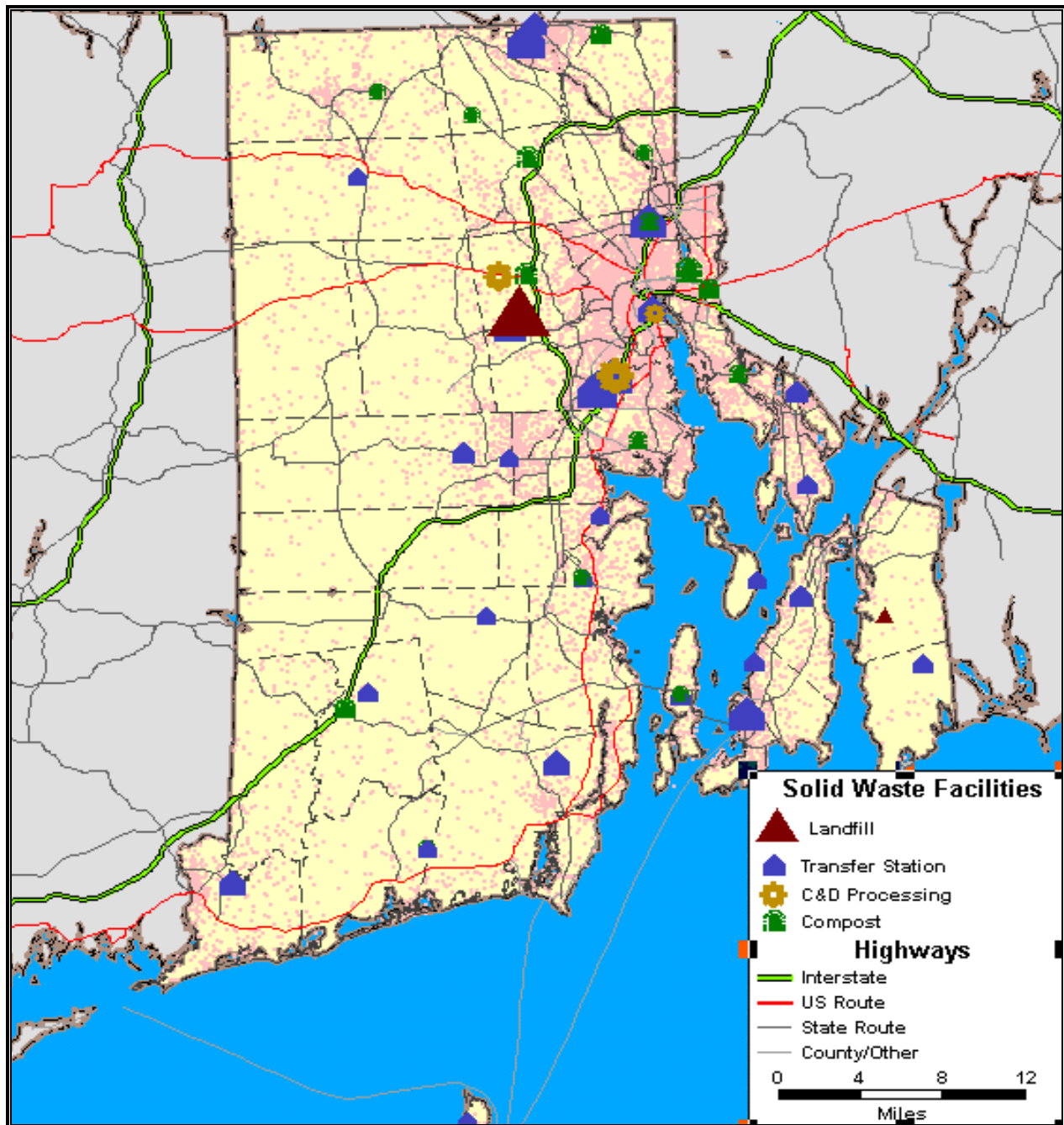
~~There are no sub-state, general purpose, regional governments, or regional planning agencies in Rhode Island. The five counties are very limited purpose administrative units with no significant waste management responsibilities.~~

3-6 TRANSPORTATION

In Rhode Island, most waste is transported by truck over the state's roadway system. However, an increasing amount of solid waste is now being hauled by rail to disposal sites beyond Rhode Island. Industry sources indicate that in 2004, as much as 500 tons per day of solid waste, most of it construction and demolition debris, was being rail hauled out of Rhode Island for disposal. Two firms, both located on rail lines, were shipping solid waste out of state in 2004. As Figure 171-3-3 indicates, most of the state is readily accessible to one or more major highways including an extensive network of limited access highways that link major urban areas.

Waterborne freight cargo facilities are available in Providence, East Providence, and North Kingstown (Quonset Industrial Park) although there is little intrastate waterborne shipping except for that provided along with passenger ferry service to Prudence and Block Islands.

Figure 171-3-3 Rhode Island Major Highways, Solid Waste Facilities, and Population Distribution



171-4 INSTITUTIONAL ARRANGEMENTS

4-1 INTRODUCTION

Responsibility for solid waste management in Rhode Island is divided among several agencies, principally the RIRRC and DEM. Municipalities also play a role, as do several other state agencies.

The current arrangement for solid waste management in Rhode Island is the result of major changes over the past 26 years that expanded the role of government and centralized functions at the state level.

This Part summarizes the current system arrangements and their evolution, and then outlines the responsibilities of key agencies. The major government responsibilities for solid waste management in Rhode Island are regulation, enforcement, planning, programs, facility siting and the provision of facilities, financing, technical assistance, and public education. While the division of responsibility for the development of facilities and regulation is relatively clear-cut, institutional arrangements for other functions have become increasingly complex and important as state government expands its waste management activities to include recycling and waste prevention and adopts a multi-agency approach.

4-2 FEDERAL ROLE IN STATE SOLID WASTE MANAGEMENT

The major influence of the federal government in state solid waste management is on regulatory programs. In addition to minor funding for recycling and waste prevention projects, the EPA provides information, policy guidance, and program guidance, on its websites at:

<http://www.epa.gov/osw/>;
<http://www.epa.gov/ebtpages/wastes.html>;
<http://www.epa.gov/epaoswer/osw/topics.htm>;
<http://www.epa.gov/ebtpages/wastsolidwaste.html>

EPA regulates solid waste management under the Resource Conservation and Recovery Act (RCRA). EPA, which has delegated its solid waste management regulatory authority to DEM, requires the state to adopt regulations and management plans related to solid, hazardous, and other wastes.

In 2002, the EPA created the Resource Conservation Challenge (RCC) as a major national effort to find flexible, yet protective, ways to conserve resources. Under the program, the EPA challenges manufacturers, sellers, and consumers to: 1) prevent pollution and promote recycling and reuse of materials; 2) reduce the use of toxic chemicals; and 3) conserve energy and materials. The RCC consists of voluntary programs and projects with a materials management and resource conservation focus. Through education and outreach, the RCC asks consumers to make smarter purchasing and disposal decisions to conserve natural resources, save energy, and preserve the environment. Through the RCC, the EPA promotes a system of efficient materials management by identifying waste that can be safely recycled

and reused and examines wasteful processes to eliminate inefficiencies and toxic materials altogether. For those who participate in the RCC, the EPA has said it will commit to mobilize its institutional resources to bring sustained and focused attention and responsive decision-making to achieving RCC goals.

4-3 STATE AGENCY RESPONSIBILITIES FOR WASTE MANAGEMENT

In contrast to most other states, Rhode Island state government agencies not only regulate solid and hazardous waste management, but also provide recycling and disposal facilities for municipal and commercial solid waste. In many other states, regulation is dispersed throughout state, county, and municipal government agencies. Facilities are provided by local, county, or regional agencies (commonly solid waste authorities) or the private sector. However, in Rhode Island, the small size of the state, the dominance of the central metropolitan area, and the minimal level of regional or county government have contributed to centralization of these functions at the state level.

In Rhode Island, most major waste management functions are vested in two agencies: the RIRRC and DEM. RIRRC's major responsibility is developing and operating facilities and programs for solid waste management, while the DEM is mainly responsible for regulating solid and hazardous waste management facilities and recycling activities. However, both agencies have other responsibilities, including planning, public education, technical assistance, and funding.

RIRRC's role includes:

- 1) ownership and operation of the Landfill, which serves very nearly 100 percent of the state's municipal and commercial solid waste disposal needs;
- 2) ownership and operation of the Material Recovery Facility which serves the recycling needs of all of Rhode Island's municipalities;
- 3) operation of the state's household hazardous waste disposal program; and
- 4) various waste prevention, resource recovery, and recycling programs including the management of specific types of waste including construction & demolition debris, waste tires, leaf & yard debris, white goods, clean wood, waste oil, and wastewater treatment plant sludge.

DEM's ~~statutory responsibilities~~role includes:

- 1) the regulation of the design and operation of waste management facilities;
- 2) the regulation of waste management programs; and
- 3) the planning, development, and administration of certain waste management programs such as municipal recycling, commercial recycling, state agency recycling, waste prevention, recyclables market development, and leaf and yard waste composting.

However, repeated budget cuts have forced the Department to reallocate resources from non-

regulatory solid waste management programs and activities to more pressing environmental priorities and responsibilities.

The Rhode Island General Laws include widely different approaches to allocating responsibilities for waste management. For example, the implementation of statutorily mandated municipal recycling programs at the local level requires a high level of coordination between RIRRC and the municipalities. As another example, solid waste facility siting requires a high level of coordination at the state level among the Governor's Office, RIRRC, DEM, the State Solid Waste Facility Siting Board, and the SPC.

The following sections summarize waste management responsibilities for RIRRC, the DEM, the Departments of Administration and Health, and the Economic Development Corporation.

4-3-1 Rhode Island Resource Recovery Corporation

RIRRC, a quasi-state agency, is charged with developing "an integrated statewide system of solid waste management facilities" [RIGL §23-19-4(b)], including recycling facilities. Facilities can be funded through revenue bonds. RIRRC plans, owns, and operates solid waste management facilities, and plans and implements commercial and municipal recycling and waste prevention programs. As the principal solid waste management organization in the state, RIRRC disposes of more than 99 percent of the state's solid waste and processes more than 95 percent of the recyclables recovered from the municipal waste stream. In 2005, it was the only state-level agency operating non-regulatory solid waste management programs and supporting commercial and state agency recycling.

~~In 2005, The RIRRC was is governed by a nineseven-person Board of Commissioners that was established by Section 23-19-6 of the Rhode Island General Laws. The Director of the R.I. Department of Administration or his/her designee serves as a non-voting ex-officio member; the remaining six members are appointed by the Governor, subject to the advice and consent of the State Senate. The members serve staggered three-year terms. ~~Six members of the board are appointed by the Governor, one of whom must be the elected chief executive of a municipality, one a resident of the Town of Johnston, and one the Director of the R.I. Department of Administration or his/her designee. Two members of the State House of Representatives appointed by the Speaker of the House sit on the Board, as does one State Senator appointed by the Senate President until such time as a new Separation of Powers statute reconfiguring the Board is passed into law. The gubernatorial appointees are subject to the advice and consent of the State Senate.~~~~

~~The Chair, who is appointed by the Governor from among the nine, is the Chief Executive Officer of the Corporation.~~

The Board of Commissioners, as RIRRC's governing body, establishes policy and approves all major contracts, projects, facilities, programs, the agency's annual budget, and its Five-Year Capital Program.

4-3-1-1 Facilities

The RIRRC operates the major solid waste management system in Rhode Island. This

consists of the Landfill and its support facilities which include: 1) the Tipping Facility; 2) the Landfill Leachate Treatment Facility; 3) the pumping station and sewer main which deliver treated landfill leachate to the Cranston waste water system; 4) two landfill gas-fired electric power generating stations; 5) the C&D Processing Facility which crushes C&D for use as landfill cover material; 6) a composting facility which handles commercial and municipal leaf and yard debris and clean wood; 7) the MRF; and, 8) the Eco-Depot for household hazardous waste. All facilities are located at the RIRRC complex in Johnston.

4-3-1-2 Waste Prevention

RIRRC also has been delegated responsibility to encourage waste prevention [RIGL §23-19-4 (f)]. Waste prevention activities are discussed in greater detail in Part 6-2.

4-3-1-3 System Development Plan (SDP)

The SDP includes waste generation rates by municipality, municipal and commercial tonnage, baseline solid waste data for the state, 20-year solid waste projections for the RIRRC waste management facility and program planning, and a provision for the annual assessment of the effectiveness of the RIRRC facilities and programs. The SDP must be consistent with the DEM regulations and the State Guide Plan.

4-3-1-4 Comprehensive Solid Waste Management Plan

RIRRC, the DEM, and the SPC cooperate in the preparation of the Plan [RIGL §23-19 (6)].

4-3-1-5 Solid Waste Facility Siting

Siting state solid waste facilities is provided for by RIGL §23-19, which gives RIRRC broad authority to plan, acquire sites, and develop facilities.

In 1989, legislation [RIGL §23-19-10.2] established a process for the siting of solid waste disposal facilities. The legislation required a statewide search to identify the most environmentally appropriate site(s) for solid waste facilities. One of the law's most important features is the granting of eminent domain to RIRRC under tightly controlled and limited circumstances requiring that any new sites to be acquired must be: 1) certified as consistent with the State Guide Plan by the SPC; 2) approved by a newly created Solid Waste Facilities Siting Board; and 3) approved in writing by the Governor. Solid waste facility sites that do not require the use of eminent domain are not subject to the aforementioned process but do require approval by the SPC.

4-3-1-6 Regulatory Authority

While RIRRC has the power to adopt rules and regulations concerning the operation of its programs and facilities [RIGL §23-19-10(5)], it has no regulatory responsibilities beyond the boundaries of its own property and its authority is confined to the operation of its own facilities. However, the ability to regulate disposal at Corporate facilities confers considerable power since virtually all the solid waste generated in Rhode Island is disposed of at the RIRRC facilities. The Corporation is authorized by RIGL §23-19-13.1 to promulgate any rules and regulations that may be necessary to ensure that out-of-state waste

is not disposed of at the Landfill. Such regulations have not been promulgated, but the prohibition is incorporated into the Commercial Solid Waste Contracts for implementation.

As part of its responsibility to manage facilities, RIRRC also establishes policy governing the types of waste accepted at its facilities and conditions under which waste will be accepted. An example is the July 1987 policy restricting disposal of certain sludges and liquids.

RIGL §23-19-13.1 prohibits disposal of out-of-state waste at the Central Landfill.

4-3-1-7 Financial Assistance

Financial assistance provided by RIRRC directly to citizens includes:

- receiving and disposing of household hazardous waste at no cost to Rhode Island residents. Since the assumption by RIRRC of this responsibility from the DEM in 2001, the cost of this program through April 2004 was approximately \$850,000;
- receiving at no cost hundreds of thousands of pounds of computers and other electronics components which RIRRC pays to have recycled;
- providing backyard composting bins, vermi-composting bins, and other composting equipment to homeowners at a discount of about 50 percent.

4-3-1-8 Regional Participation

RIRRC has assumed a leadership role in the Northeast Recycling Council (NERC). RIRRC also participates in the Toxics in Packaging Clearinghouse (TPCH)

4-3-2 Rhode Island Department of Environmental Management

In addition to broad authority to “supervise and control the protection, development, planning, and utilization of the natural resources of the state . . .” [RIGL §42-17.1-2], the DEM has specific responsibilities for solid waste management.

The Department’s major function in this area is regulatory: permitting and monitoring solid waste facilities and adopting and administering regulations and environmental regulations (particularly, air, water quality, and freshwater wetlands that affect or are affected by waste management). These functions are primarily carried out by DEM’S Office of Waste Management.

In the late 1980’s and early 1990’s, DEM’s role expanded to include technical assistance, public education, and grant programs for research and development in waste reduction and recycling. The Department’s Ocean State Cleanup and Recycling Program (OSCAR), established by the Litter Control and Recycling Act of 1984 and expanded in the 1986 amendments to the solid waste statutes, played a key role in delivery of these services. The DEM also operated the household hazardous waste collection facility – Eco Depot – and provided funding and assistance to municipalities to operate used oil collection centers. The Department transferred its recycling technical assistance programs and operation of the Eco Depot in 1999 and 2001, respectively, to RIRRC because of the budget cutbacks and changing priorities noted above. The Department continues to administer the used oil

program.

DEM's solid waste and recycling programs are summarized below.

a. Statewide Source Separation and Recycling Program

The Department's role in the statewide source separation and recycling program includes adopting rules and regulations for recycling activities and revising them as necessary, compliance and enforcement of municipal and commercial recycling regulations, and coordinating litter control activities. Again, many of these activities have been largely curtailed due to budgetary cutbacks.

b. System Development Plan

DEM reviews the SDP as part of the process for licensing RIRRC disposal facilities and ensures that the SDP is consistent with the DEM regulations.

c. Comprehensive Solid Waste Management Plan

DEM cooperates with the RIRRC and the SPC in the preparation of the Plan, which it formally adopts after public hearing.

d. Solid Waste Facility Licensing

DEM establishes minimum standards for permissible types of refuse disposal facilities, and the design and construction, operation, and maintenance of disposal facilities [RIGL §42-17.1-2(p)]. The Department is also authorized to issue and enforce rules, regulations, and orders as necessary to carry out its duties.

e. Regulatory Authority

DEM's Office of Waste Management is responsible for adopting and administering rules and regulations governing the management of solid waste and the design and operation of solid waste facilities, including the following:

Solid Waste Regulation No. 1, General Requirements, May 7, 2001; No. 2, Solid Waste Landfills, February, 1997; No. 3, Transfer Stations and Collection Stations, March, 1997; No. 4, Incinerators and Resource Recovery Facilities, January, 1997; No. 5, Waste Tire Storage and Recycling, January, 1997; No. 6, Petroleum Contaminated Soil Processing Facility, January, 1997; No. 7, Facilities that Process Construction and Demolition Debris, May 5, 2001; No. 8, Waste Composting Facility, May 7, 2001.

DEM has developed a registration program for Intermediate Processing Facilities to allow the processing of recyclables without having to obtain a Solid Waste Facility license. This will also provide the department with valuable recycling data.

DEM has also promulgated and is responsible for enforcing the Rules and Regulations Governing the Generation, Transportation, Treatment, Management, and Disposal of

Regulated Medical Waste in Rhode Island, as amended in July, 1994.

Furthermore, with respect to solid waste recycling, the following regulations and statute fall under DEM's jurisdiction:

- **Rules and Regulations for the Reduction and Recycling of Municipal Solid Waste**, March, 1997, which define recyclables; set standards for municipal ordinances governing the separation of municipal waste into recyclable and non-recyclable components; specify compliance standards for recycling programs; and, establish procedures for financial aid to cities and towns.
- **Rules and Regulations for Reduction and Recycling of Commercial and Non-Municipal Residential Solid Waste**, October 13, 1996, which define commercial recyclables; set schedules for submitting waste prevention and recycling plans; and, establish enforcement procedures for the regulations.
- **R.I.G.L. §23-18.16-1 et. seq. Newspaper Recyclability**, establishes minimum recycled content requirements for newsprint and for the publications to report their use of recycled content.

The Department also has the authority to adopt rules and regulations, as may be necessary, to require the collection and recycling of telephone directories, determine the recyclability of beverage containers, implement and carry out the provisions of the Toxics in Packaging Act, and to establish specifications for the purchase of recycled products by the State.

The Department's Office of Water Resources oversees the Rules and Regulations for the Treatment, Disposal, Utilization, and Transportation of Sewage Sludge. These regulations apply to sewage sludge generated by publicly- or privately-owned facilities and cover incineration, treatment (including composting), land disposal, and land application. The current version of the regulations was adopted in May 1997.

f. Facility Reporting

DEM collects annual facility reports from all permitted solid waste facilities on the source and disposition of all materials handled.

g. National and Regional Coordination

On the national level, the Department is actively involved in the national Association of State and Territorial Solid Waste Management Officials (ASTSWMO). Regionally, the DEM plays a coordinating role with other regional state solid waste regulatory agencies through its participation in the Northeast Waste Management Official's Association (NEWMOA), which produces an annual report on regional waste generation and state imports and exports. The DEM also participates in the regional Interstate Mercury Education and Reduction Clearinghouse (IMERC), the Product Stewardship Institute (PSI), the Toxics in Packaging Clearinghouse, and occasionally in NERC.

4-3-3 The Departments of Administration and Health

Certain other agencies have limited, specific responsibilities for solid waste management. These include the Department of Administration (Division of Planning, Budget Office, and Office of Purchasing), and the Department of Health.

Department of Administration

Division of Planning

The Division of Planning provides planning services to the Governor and other state agencies; coordinates development decisions within the framework of state plans; maintains a planning information base; and provides services related to local planning and municipal affairs. The State Planning Council (SPC), which is comprised of State, municipal, and federal government representatives and members of the public, provides policy direction to the Division of Planning. The SPC is responsible for promulgation of the State Guide Plan, which includes Element 171, this Comprehensive Solid Waste Management Plan and other plans related to the physical, social, and economic development of the state.

Furthermore, the SPC is statutorily responsible for certifying that new solid waste facility sites proposed by RIRRC comply with site evaluation and assessment standards and procedures issued by the Council. The Division of Planning also reviews such proposals for compliance with the State Guide Plan. RIRRC's SDP establishes the need for solid waste management facilities under RIGL §23-19-4(b). The SPC reviews and approves this need determination since the SDP is included in Element 171 of the State Guide Plan. According to state law, the SPC has the additional powers to determine the geographic distribution of solid waste facility sites in the state and to designate areas where solid waste management facilities are prohibited.

Office of State Purchasing

The Office of State Purchasing is charged with promoting the purchase of recycled products as well as adopting regulations for purchasing recycled products.

Solid Waste Facilities Siting Board

The Solid Waste Facilities Siting Board was created in 1989 as a part of the Department of Administration. The members, who are appointed by the Governor, include the Governor's legal counsel, the Director of the Department of Administration, a business or industry representative, a member of the RI League of Cities and Towns, and an environmental advocate. The Siting Board is charged with advising the Governor on the need of RIRRC to acquire additional future solid waste management facility sites.

Department of Health

The Department of Health regulates management of infectious wastes from hospitals and laboratories.

4-4 THE TOWN OF JOHNSTON

In April 1996, RIRRC and the Town of Johnston ratified an historic host community agreement. Under the agreement, RIRRC annually pays the Town a base payment of \$1.5 million; 3.5 percent of RIRRC's previous fiscal year's gross revenues; free tipping for Johnston residents, and methane royalty payments. In the first full year of the agreement, FY 1997, these payments totaled more than \$3.2 million and have exceeded \$3.2 million annually thereafter because of escalators built into the payments. The host community agreement provided for several other financial settlements and settled a number of major policy issues that had strained relations between the Town and RIRRC for more than a decade. Some of the highlights of the host community agreement are as follows:

- RIRRC will not seek landfill expansion to the north or west of existing operations.
- Landfill expansions to the south of existing operations are specifically approved, including Landfill Phases IV and V. Moreover, the Town has agreed to cooperate with RIRRC and assist it in obtaining licenses and permits for Landfill Phases IV and V, which are addressed in detail in Part 6 of this Plan.
- Landfill expansion to the east of existing operations is not prohibited.
- The agreement also provides that the Town and the RIRRC will cooperate in the development of improved highway access to the Landfill from Route I-295 and the development of an industrial park.

4-5 LOCAL GOVERNMENT RESPONSIBILITY IN SOLID WASTE MANAGEMENT

Cities and towns, once the major providers and regulators of local solid waste disposal, continue to have an important but far more limited role in providing solid waste disposal service and in regulating private solid waste service providers. However, in some respects, particularly separation and collection of recyclables and directing the flow of locally generated solid waste, their responsibilities have expanded.

4-5-1 Providing for Recycling and Disposal

With the establishment of the Rhode Island Solid Waste Management Corporation (later the Rhode Island Resource Recovery Corporation) in 1974 and its statutory mandate to provide low cost disposal of municipal refuse, the historical responsibility for solid waste disposal began to transfer from the municipalities to the State. This transfer accelerated as most municipal landfills closed during the 1970's and 1980's. As part of its mandate to serve municipalities, RIRRC has, from its inception, offered cities and towns a discounted tipping fee that has always been lower than the fees paid by the private sector for the disposal of commercial waste. The municipal tipping fee has been held at \$32.00 per ton since fiscal year 1992 while the commercial tipping fee increased steadily, reaching \$52.50 per ton in 2006.

The 1986 amendment to the solid waste statutes further limited municipal responsibility for disposal by excluding those wastes not acceptable at an RIRRC facility, as well as hazardous

wastes. Collection responsibilities of municipalities were broadened, however, to cover separate collection of recyclables.

State law requires municipalities to adopt ordinances to mandate source separation and recycling programs and allows municipalities to design and implement programs to fit local circumstances. Local conditions vary greatly between rural, suburban, and urban communities. Therefore, the type andThe success of municipal recycling programs depend not only on the commitment of the local government but also on factors such as the percentage of people living in poverty, the percentage of the population who are transient, and the number of people living in multi-family residences which are not covered by municipal recyclingare, for the most part, functions of the manner in which they are implemented and managed.

Municipalities are required to ensure that all recyclables recovered from their MSW are delivered to a RIRRC facility. As an incentive to encourage recycling, the General Assembly, in 1986, stipulated statutorily that the discounted municipal tipping fee shall apply only to that tonnage of solid waste disposed by each municipality which is less than or equal to a solid waste tonnage Cap established by RIRRC. All MSW in excess of a municipality's Cap is disposed of at the CSW tipping fee that is substantially higher than the municipal tipping fee. The incentive for municipalities to increase their diversion rate is heightened by a decrease in the Municipal Cap because the lower the Municipal Cap, the more MSW tonnage the municipality must dispose of at the higher commercial rate.

Furthermore, the statute requires that cities and towns must dispose of their solid waste at the Landfill or an RIRRC-designated disposal facility. Tiverton is the only municipality specifically exempted by the law from this requirement because the town has an active landfill (which was still in operation at the time that this Plan was adopted). To meet this responsibility, most municipalities provide collection directly or by contract. In some communities, individual residents hire private haulers to collect their solid waste and transport it to a state-approved facility.

4-5-2 Regulation

In 1975, the State assumed responsibility for licensing solid waste management facilities. In 1986, municipalities were authorized by state law to license local collectors, haulers, and operators of transfer stations [RIGL §23-18.9-1 (b) (1)]. Under the 1968 Refuse Disposal Act cities and towns were required to regulate collection, hauling, and disposal.

The 1986 legislation established requirements for the adoption of local regulations for:

- the fair allocation of the Municipal Tipping Fee among privately contracted collectors of municipal refuse [RIGL §23-18.9-1(b)(3)]; and
- the separation of solid waste into recyclable and non-recyclable components [RIGL §23-18.9-1(b)(4)].

4-5-3 Financing

Since 1986, municipal solid waste tipping fees have been established by state law and since

FY 1992, have been annually set statutorily by a state budget provision at \$32.00 per ton. The municipal tipping fees are significantly lower than the commercial solid waste tipping fees, which were \$50.00/ton in fiscal year 2005.

Financial assistance by RIRRC for municipal solid waste management activities has been extensive. Municipalities tip recycled materials free of charge at RIRRC facilities, and RIRRC financed the first three years of each municipality's recycling program. These initial recycling program start-up costs included purchase of some municipal recycling trucks and the funding of municipal recycling coordinators. RIRRC also provided each municipality with new blue and green recycling bins for the Maximum Recycling Program free of charge. In 2001, RIRRC began providing household hazardous waste disposal services free to municipalities and in 2004, the Corporation began receiving and composting leaf and yard waste from municipalities free of charge. In addition, RIRRC has provided annual grants (totaling more than two million dollars over the years) to municipalities based on the percentage of the recipient's MSW that is extracted and recycled. Moreover, RIRRC has provided to municipalities a wide range of recycling/waste prevention-related research and innovative technology/program grants that have totaled more than one million dollars.

Municipal solid waste costs are generally financed by local general revenues, largely the property tax. Charlestown, Hopkinton, New Shoreham, North Kingstown, Richmond, South Kingstown, Narragansett, West Greenwich, and Westerly however, have implemented various types of partial and/or hybrid user fee programs to pay for the cost of solid waste collection and disposal.

4-6 RIRRC CITIZEN ADVISORY BOARD

The Citizen Advisory Board (CAB) was established by the same legislation that set up RIRRC. Its statutory role is to advise the Corporation on ways it can improve the management of solid waste in Rhode Island and report its findings to the Governor annually. By mutual agreement between RIRRC and Advisory Board members, this board was allowed to become inactive in 1992. It remains inactive.

Recommendation

Immediately upon adoption of this Plan by the SPC, RIRRC shall request the Governor to appoint members to the Citizen Advisory Board, thereby reactivating the CAB as a means of maintaining a formal link between RIRRC and stakeholders in solid waste management.

4-7 PRIVATE SECTOR ROLE

As governments have assumed more responsibility over waste management, the role of the private sector has also changed, with most MSW now either collected or transported to the Central Landfill by private haulers under contract to municipalities. Private haulers have, for the most part, taken over the collection of trash from municipal public works crews as municipalities have increasingly out-sourced this job. In 2004, only seven municipalities, Barrington, Central Falls, Coventry, Lincoln, Pawtucket, Warwick, and West Warwick

collected trash curbside using their own staff and equipment. All other municipalities either contracted out the collection of trash or left it to homeowners to individually hire private haulers for the purpose. Private arrangements continue to predominate in collection, hauling and recycling commercial/industrial solid waste, and in handling hazardous waste.

Similarly, in the field of recycling, most municipal recyclables are handled by private haulers operating either under contract to municipalities or on their own business initiative and enterprise. Therefore, the success of most municipal recycling programs depends, not only on the quality of municipal management, but also on the effectiveness and efficiency of the haulers' operations and the relationship between the haulers and the municipalities who hire them.

While municipalities have maintained an operational and/or management role in the field of municipal recycling, there is no operational involvement by state or local government in commercial recycling which is conducted entirely by private sector. Hauling firms such as BFI and Waste Management recover large volumes of recyclable materials, particularly wood and corrugated cardboard, at their transfer stations. Other haulers, such as Pond View, Tri-State, and Coastal Recycling, specialize in processing construction and demolition debris and recovering recyclables from the C&D stream. Companies such as International Forest Products, United Paper Stock, and Berger have been in the business of buying and re-selling all types scrap papers for decades. CleanScape, a young and growing recycling company in Providence, is developing its business in the field of collecting waste paper from large private and government institutions for resale.

The hauling industry in Rhode Island has undergone very significant transformations over the past 20 years. As recently as the mid-80s, it consisted entirely of small, local, independent privately-owned firms, several of which owned and operated landfills. By 2004, after a period of consolidation during the 1990s, the hauling industry in Rhode Island was dominated by two large publicly-owned national firms, Allied Waste Industries, doing business in Rhode Island as BFI, and Waste Management, Inc. Together, these two firms control about 50 percent of the commercial solid waste business in the state. There were also about 50 small, local privately-owned firms active in Rhode Island in 2005. No hauling firm owned a landfill in Rhode Island.

4-8 ENVIRONMENTAL PROTECTION REGULATION

Federal, state, and local environmental protection regulations have influenced solid and hazardous waste management decisions from design of laws to selection of technologies. Federal pollution control laws, most notably the Clean Water Act and the Clean Air Act, established regulatory approaches (permit requirements, analytical techniques, etc.) and minimum standards. In many cases, these or more stringent versions are adopted and administered by the state.

In Rhode Island, most of these regulations -- wetlands, air pollution control, water quality, coastal management -- are administered at the state level by either the Department of Environmental Management or the Coastal Resources Management Council. Drinking water quality is regulated by the Department of Health. In addition, a groundwater classification

program developed by the DEM includes provisions for waste management facilities.

4-9 PERMITTED SOLID WASTE FACILITIES

Although Table 171-4-1 contains a long list of the various types of solid waste management facilities located throughout the state that are either licensed by or registered with DEM, a review of the table demonstrates the extent to which solid waste management in Rhode Island, except for composting, is dominated by RIRRC and two huge national companies -- Waste Management Inc. and BFI. There is only one disposal facility of any significance, the Landfill. Most of the transfer stations are tiny operations dedicated to handling municipal waste generated within the transfer station's host community and the only private, commercial transfer stations are owned or operated by BFI and Waste Management. Although not shown in the table, most of the transfer stations in suburban and rural towns also serve as drop-off centers for recyclables.

Table 171-4-1 Permitted Solid Waste Facilities

Facility Type	Facility Name	Capacity Description	Location City	Ownership
Landfill	RIRRC Central Landfill	4,000 tons/day	Johnston	public
Landfill	Tiverton	9000 tons per year	Tiverton	public
C&D Processing	Coastal Recycling	50 tons per day	Providence	private
C&D Processing	Pond View Recycling	150 Tons per day	East Providence	private
C&D Processing	RIRRC-Plainfield Pike Facility	400 Tons per day	Cranston	public
C&D Processing	Waste Management Transfer Station and C&D Facility	700 Tons per day	Warwick	private
Composting	Barrington Compost Facility	25000 yards per year	Barrington	public
Composting	Burrillville Compost Facility	3500 yards per year	Burrillville	public
Composting	Charlestown Landfill and Compost Facility	4000 yards per year	Charlestown	public
Composting	DiCenzo Construction Company Composting Facility	400 yards per year	North Smithfield	private
Composting	East Providence Composting Facility	30000 yards per year	East Providence	public
Composting	Jamestown T.S. and Composting Fac.	150 yards per year	Jamestown	public
Composting	North Kingstown T.S. and Compost Facility	2000 yards per year	North Kingstown	public
Composting	Pascale Landscaping	500 yards per year	Cumberland	private
Composting	Pawtucket Composting Facility	5000 yards per year	Pawtucket	public
Composting	RIRRC (Central Landfill) Compost Facility	17000 yards per year	Johnston	public
Composting	Richmond Sand & Gravel Compost Facility	37500 yards per year	Wyoming	private
Composting	S. Vadenais Loom & Mulch, Inc.	30000 yards per year	Cumberland	private
Composting	Smithfield Peat Compost Facility	100000 yards per year	Smithfield	private
Composting	Warren Compost Facility	3700 yards per year	Warren	public
Composting	Warwick Compost Facility and MRF	25000 yards per year	Warwick	public
Contaminated Soil	D'Ambra Construction Co. Soil Processing Facility	788 tons per day	Warwick	private
Transfer	BFI Transfer Station	650 tons per day	North Smithfield	private
Transfer	Blackstone Valley Regional Transfer Station	600 tons per day	Pawtucket	private
Transfer	Bristol Transfer Station	11000 tons per year	Bristol	public
Transfer	Charlestown Transfer Station	15 tons per day	Charlestown	public
Transfer	Coventry Transfer Station	90 tons per day	Coventry	public
Transfer	East Greenwich Transfer Station	16 tons per day	East Greenwich	public
Transfer	Exeter Transfer Station	20 tons per day	Exeter	public
Transfer	Glocester Transfer Station	15 tons per day	Glocester	public
Transfer	Jamestown Transfer Station	36 tons per day	Jamestown	public
Transfer	Little Compton Transfer Station	24 tons per day	Little Compton	public
Transfer	Middletown Collection Station	50 tons per day	Middletown	public
Transfer	New Shorham Transfer Station	20 tons per day	New Shorham	public
Transfer	Newport Transfer Station	545 tons per day	Newport	public
Transfer	North Kingstown Transfer Station and Composting Fa	19 tons per day	North Kingstown	public
Transfer	Portsmouth Transfer Station	70 tons per day	Portsmouth	public
Transfer	Providence Transfer Station	250 tons per day	Providence	public
Transfer	Prudence Island Transfer Station	4 tons per day	Portsmouth	public
Transfer	Richmond Transfer Station	50 tons per day	Richmond	public
Transfer	RIRRC-Plainfield Pike Facility	400 tons per day	Cranston	public
Transfer	Service Transport Group Transfer Station	100 tons per day	Woonsocket	private
Transfer	South Kingstown (Rose Hill) Transfer Station	180 tons per day	South Kingstown	public
Transfer	Warren-Barrington Regional Transfer Station	75 tons per day	Warren	public
Transfer	Waste Management Transfer Station (Pontiac Ave.)	750 tons per day	Cranston	private
Transfer	Waste Management Transfer Station and C&D	740 tons per day	Warwick	private
Transfer	West Greenwich Transfer Station	5 tons per day	West Greenwich	public
Transfer	Westerly Transfer Station	200 tons per day	Westerly	public

171-5 PROJECTIONS OF WASTE QUANTITIES

5-1 INTRODUCTION

This section provides information regarding the quantity of solid waste expected to be generated in the future, along with projections of how much of that waste could be recycled, composted, and disposed. These projections are critical to the planning of facilities and programs necessary to effectively manage solid waste in Rhode Island and meet the goals established in this Plan. The methodology utilized to develop these projections, and the assumptions employed are described in this section, along with the results of the projections. The many factors that can affect these projections are discussed, and the programs and facilities necessary to support the projected levels of waste prevention, recycling, composting, and disposal are described in Part 8.

5-2 CURRENT LEVELS OF WASTE GENERATED, RECYCLED, COMPOSTED, AND DISPOSED

The starting point for any projection of waste quantities must be the current status of solid waste management. In addition to establishing the current quantities of waste generated, recycled, composted, and disposed, a judgment must be made as to whether or not the current quantities are anomalous. In other words, it must be determined if the conditions that caused the current status are unusual and temporary, which would mean that the current status would not be a good starting point for a long-term projection. It is fortunate that for this Plan there is sufficient data not only to assess the current status of solid waste management with reasonable accuracy, but also to determine if the current status is consistent with historic data.

In 2005, 1,169,770 tons of solid waste were disposed of at the Landfill and a total of about 163,546 tons of material were either processed by RIRRC facilities for recycling or composted at RIRRC and municipal facilities. Because tipping fees in all neighboring states are more than double Rhode Island's municipal tipping fee, it is almost certain that all MSW in the state, except for Tiverton's³, (or about 99.2 percent of the total) is disposed of at the Landfill. Likewise, because commercial waste disposal costs in out-of-state facilities are higher than disposal costs at the Landfill, it is unquestionable that most all commercial waste generated within Rhode Island is disposed of at the landfill. Although out-of-state disposal is prohibited, Rhode Island's lower tipping fee is certainly an inducement to illegal out-of-state waste entering the facility.

Therefore, with an estimated population of 1,062,441 in 2005, Rhode Island's waste generation rate is 1.24 tons of solid waste per capita per year⁴, which is less than the national waste generation rate estimated by BioCycle Magazine to be 1.31 tons per capita per year.

³ Tiverton disposes of its MSW at its own landfill

⁴ [This does not include materials utilized for alternate daily landfill cover.](#)

There are two main sectors of solid waste that will be addressed in these projections, municipal waste and commercial waste. Municipal waste is the waste that the municipalities have responsibility to manage, which is primarily waste generated at residences, although certain institutional wastes, such as that generated by public schools, are often included. CSW is the remainder of the solid waste, and since it is not the responsibility of municipalities to collect this waste, businesses and other waste generators contract with private collection companies for this service. Since these waste streams are different in terms of their composition, management, and entity responsible for collection, they are addressed separately in these projections. The results are combined to describe the management of the combined solid waste stream.

5-2-1 Current Status of Municipal Waste Management

For the purposes of this Plan, the “current status” of solid waste management refers to ~~the status in 2005, since that is~~ the last full year for which records are available. In 2005, 449,838 tons or approximately 98 percent of the municipal waste generated in Rhode Island ~~that was shipped to disposal~~ was disposed at the Landfill, ~~and Table 171-5-1 shows the quantity disposed on a town-by-town basis.~~ In addition, 78,931 tons of recyclable materials from municipal sources (net of residue) were recovered at the RIRRC’s MRF ~~in 2005.~~ Furthermore, 4,119 tons of white goods and scrap metal, 644 tons of tires, and 803 tons of other materials were diverted from landfilling by municipalities and RIRRC and therefore fall under the general rubric of MSW. Table 171-5-1 shows the quantity of solid waste disposed and recycling data on a town-by-town basis ~~also shows these recycling data for each community.~~

The 1996 Plan reported 5,754 tons of leaf and yard debris were composted in 1994 while this Plan reports that an estimated total of 43,260 tons of municipal leaf and yard waste were composted in the base year of 2005 at municipal facilities, at the Landfill complex by the Corporation, or at other facilities. The difference between the amounts composted in 1994 and 2005 reflect the improved data reporting and collection procedures put in place by RIRRC and the municipalities. Specifically, the composting data were reported by the state’s 39 cities and towns in a survey conducted by the Corporation in 2005. The 43,260 tons of leaf and yard debris represents about 7.3 percent of the total municipal waste stream (not including commercial leaf and yard waste). While a significant improvement over 1994, it is still well below the 1990 Waste Composition Analysis that indicated leaf and yard debris represent about 13.4 percent (approximately 80,000 tons) of the municipal waste stream. ~~It does not include commercial leaf and yard waste composting.~~

Over the years, RIRRC has made heavy staff and financial investments to facilitate the development of both large-scale municipal and backyard composting. A number of municipalities took advantage of the opportunities and developed large, effective and sophisticated composting programs that are currently producing most of the aforementioned compost tonnage. RIRRC’s composting programs include the agency’s long-standing policy of providing either a deeply discounted tipping fee, or as of 2005, no tip fee for leaf and yard debris from municipalities to encourage composting. These results are shown in Table 171-5-1. Nevertheless, despite the significant amount of leaf and yard waste being composted annually and the impressive level of performance by municipalities and by the Corporation in

this area, more can be done. ~~The 1990 Waste Composition Analysis indicates that leaf and yard debris represents about 13.4 percent of the municipal waste stream (and 12.2 percent of the combined municipal and CSW waste stream) or approximately 80,000 tons of the municipal waste stream.~~

The various types and quantities of municipal waste disposed, recycled, and composted can be summed to determine total waste generation, ~~as is also~~ shown in Table 171-5-1. This yields a total of 594,919 tons generated by municipalities in 2005. Approximately 95 percent of the total municipal waste generated, disposed, and recycled in Rhode Island in 2005 was handled by RIRRC. The 24 percent increase in the quantity of municipal waste delivered to RIRRC facilities from 1994 to 2005 can be explained by three factors. First, the increase is partially reflective of the fact that five of the six municipalities that did not bring their waste to the Landfill for disposal in 1994 have since joined the RIRRC system. Only Tiverton among the state's 39 cities and towns did not dispose of its solid waste at the Landfill in 2005. Tiverton continues to operate its own sanitary landfill dedicated to the disposal of municipal solid waste generated within the town. Second, the increase in the quantity of solid waste generated reflects the growth in the population of the Landfill's watershed from an estimated 938,754 in 1994 to an estimated 1,062,441 in 2005. Finally, the increase in the amount of municipal waste generated is also indicative of the fact that Rhode Islanders, mirroring a national trend, generated more waste on a per capita basis in 2005 than they did in 1994. Therefore, as is shown in Table 171-5-1, the statewide per capita municipal waste generation rate in 2005 was calculated to be approximately 0.56 tons of MSW per year, an increase of about 19 percent from the 0.47 tons per person per year waste generation rate recorded in 1994.

If one examines ~~the current status of~~ municipal waste management estimated in the analysis described above ~~in the context of recent history~~, it can be seen that the current status is a reasonable starting point for projections. Figure 171-5-1 provides a graphical summary of the last 11 years of municipal waste management. In this chart, recycling and composting are considered together, under the general heading of recycling. It can be seen that recycling has nearly doubled over the last 11 years, and that while municipal waste has generally trended upward, the quantity of waste recycled also trended upward, and at a higher rate, over the same period of time. This is qualitatively a better performance than has been observed with respect to solid waste management nationally. While the per-capita waste generation rate for both Rhode Island and the U.S. in general has increased over the past 10 years, recycling nationally has leveled off but in Rhode Island, recycling has continued to grow. However, this observation must be tempered with the realization that even with improved recycling rates, the state is still well below the rates projected in the 1996 Plan. Nationally, waste generation has grown to the extent that more waste has been shipped to disposal every year for the past seven years. ~~At the state level, it~~ It is also important to recognize that despite the fact that the recycling rate has increased over the past 10 years, waste generation, in absolute terms, has grown by a larger amount, with the result that despite the growth observed in municipal recycling, the amount of municipal solid waste being handled by the Landfill has grown steadily over the past 10 years.

Table 171-5-1 2005 Quantities of Municipal Sector Waste Recycled, Composted, and Disposed By Municipality

Municipality	Estimated Population July 1st 2005	Landfilled	Diverted					Waste Generated (post-waste reduction)	Tons Per Capita	Overall Diversion Rate	MRF Recycling Rate ²
		Refuse Tons	MRF Recycling	Composted/ Chipped	Scrap Metal (White Goods)	Other Recycling ⁶	Tires ¹				
Barrington	16,909	6,945	2,510	1,704	361	25.45	12	11,557	0.6835	39.9%	26.5%
Bristol	22,796	8,754	1,781	3,574	247	85.23	42	14,483	0.6353	39.6%	16.9%
Burrillville	16,163	6,018	1,768	-	17	6.13	24	7,833	0.4846	23.2%	22.7%
Central Falls	19,198	6,187	1,082	97	34	13.64	3	7,416	0.3863	16.6%	14.9%
Charlestown	8,286	958	395	-	22	2.67	3	1,380	0.1666	30.6%	29.2%
Coventry	34,590	14,916	3,567	1,817	254	11.22	16	20,583	0.5950	27.5%	19.3%
Cranston	80,285	32,717	7,857	7,642	200	31.02	20	48,467	0.6037	32.5%	19.4%
Cumberland	32,506	16,637	3,354	462	60	34.47	-	20,548	0.6321	19.0%	16.8%
East Greenwich	13,330	6,540	1,695	660	-	4.82	1	8,900	0.6677	26.5%	20.6%
East Providence	48,368	18,370	4,531	4,717	253	40.58	9	27,920	0.5772	34.2%	19.8%
Exeter	6,267	2,190	627	-	-	2.47	-	2,820	0.4500	22.3%	22.3%
Foster	4,400	2,216	491	-	-	1.42	2	2,711	0.6161	18.2%	18.1%
Glocester	10,283	3,640	966	2	12	7.59	17	4,645	0.4517	21.6%	21.0%
Hopkinton ⁴											
Jamestown	5,843	3,647	1,018	38	30	1.91	4	4,738	0.8109	23.0%	21.8%
Johnston	28,654	19,044	2,444	1,195	1	9.41	2	22,694	0.7920	16.1%	11.4%
Lincoln	21,449	9,194	1,721	1	106	6.91	11	11,040	0.5147	16.7%	15.8%
Little Compton	3,664	1,976	319	-	-	1.88	23	2,319	0.6330	14.8%	13.9%
Middletown	17,350	2,938	700	-	-	5.74	-	3,644	0.2100	19.4%	19.2%
Narragansett ⁴											
New Shoreham	1,064	3,410	426	-	235	11.77	40	4,122	3.8739	17.3%	11.1%
Newport	26,086	8,634	2,178	1,075	161	8.40	-	12,057	0.4622	28.4%	20.1%
North Kingstown	26,939	8,121	3,634	323	29	27.11	13	12,146	0.4509	33.1%	30.9%
North Providence	32,861	16,373	2,770	462	-	10.61	-	19,616	0.5969	16.5%	14.5%
North Smithfield	10,708	4,857	1,377	-	-	3.45	6	6,244	0.5831	22.2%	22.1%
Pawtucket	73,203	33,343	3,803	903	260	95.49	58	38,462	0.5254	13.3%	10.2%
Portsmouth	17,553	8,213	1,365	-	-	5.88	-	9,584	0.5460	14.3%	14.3%
Providence	175,965	79,029	7,376	1,920	-	58.26	59	88,443	0.5026	10.6%	8.5%
Richmond	7,669	2,071	356	-	70	2.77	-	2,499	0.3259	17.2%	14.7%
Scituate	10,592	5,189	1,176	71	-	3.41	2	6,440	0.6081	19.4%	18.5%
Smithfield	21,133	9,339	2,160	3	17	6.91	-	11,526	0.5454	19.0%	18.8%
South Kingstown ⁴	45,926	19,535	1,930	893	-	15.15	137	22,510	0.4901	13.2%	9.0%
Tiverton	15,502	9,100	1,444	-	229	5.59	-	10,779	0.6953	15.6%	13.7%
Warren	11,461	5,346	883	495	240	181.74	12	7,157	0.6244	25.3%	14.2%
Warwick	85,624	31,950	11,009	10,766	568	27.68	33	54,355	0.6348	41.2%	25.6%
West Greenwich	5,413	1,520	390	25	-	2.54	23	1,960	0.3621	22.4%	20.4%
West Warwick	29,938	11,898	2,406	1,824	70	16.72	16	16,232	0.5422	26.7%	16.8%
Westerly ⁷	31,614	13,606	3,342	2,352	638	11.11	52	20,001	0.6327	32.0%	19.7%
Woonsocket	42,848	24,517	2,303	240	7	16.30	5	27,088	0.6322	9.5%	8.6%
RIRRC MRF Residue ³	n/a	8,224	(8,224)								
Total (net of MRF Residue)	1,062,440	467,162	78,931	43,260	4,119	803	644	594,919	0.5600	21.5%	14.5%

*Estimates reflect calendar 2005 deliveries to RIRRC and calendar 2005 figures for material delivered to other facilities or disposed at Tiverton as reported by municipalities to RIRRC. Alternate daily cover (e.g., street sweepings) and construction/demo waste segregated for processing into alternate daily cover delivered by municipalities is categorized as commercial sector waste.

¹Tires are incinerated.

²MRF Recycling Rate is the percentage of MRF Recyclables in the universe of MRF Recyclables and solid waste landfilled at RIRRC only.

³Residue is composed almost entirely of material received in the Mixed Recyclables stream which does not meet product delivery standards.

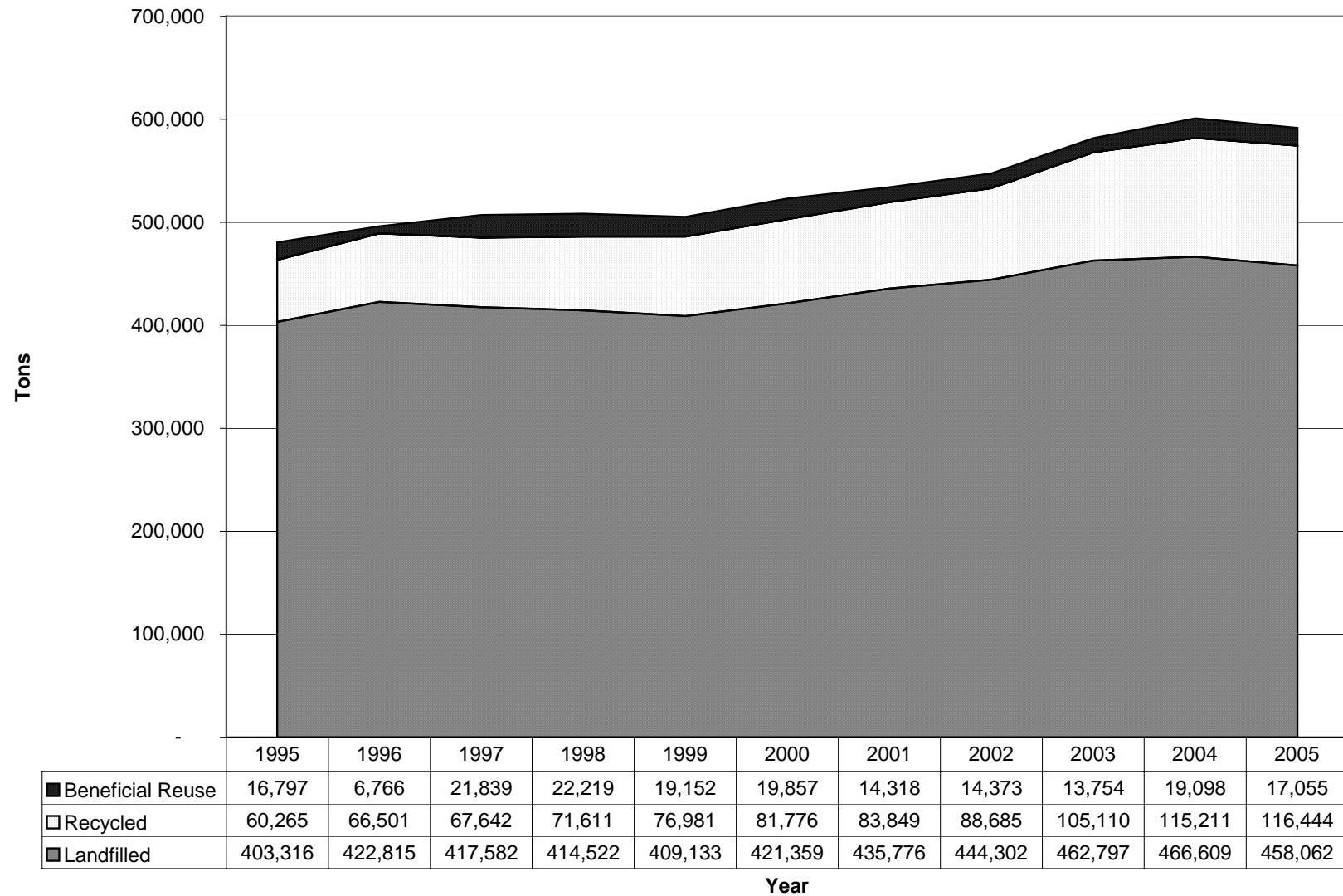
The above figures for municipalities does not include residue. However, the totals below are net of residue.

⁴Hopkinton residents utilize Westerly's facilities and Narragansett residents utilize South Kingstown.

⁵ Does not include municipal sector materials coded to other organizations such as regional school districts and Newport Navy.

⁶Mattresses delivered in dedicated loads to RIRRC, Consumer Electronics, and Household Hazardous Waste collected by RIRRC sponsored programs which is allocated among municipalities based on population.

⁷Municipalities delivering waste co-mingled with commercial sector waste though transfer stations adjusted to reflect the current fiscal year municipal cap allotments.

Figure 171-5-1 Municipal Sector Materials Handled by RIRRC

Note: Quantities represent materials delivered to RIRRC by municipalities. Recycling is net of MRF residue.

5-2-2 Current Status of Commercial Waste Management

There are two key differences in assessing the status of CSW management and that of municipal waste. The first is that the quantity of CSW disposed at the Landfill has fluctuated much more sharply over the last 10 years, compared to the relatively constant flow of municipal waste. While the quantities of both municipal and commercial sector waste generated have increased over the past 12 years, municipal waste disposal has increased by 34 percent while CSW disposal has almost tripled from about 400,000 tons in 1994 to 1,128,659 tons in 2005, reflecting for the most part the closure of several nearby landfills in Massachusetts and the very sharp increase in disposal rates at Massachusetts disposal facilities relative to the tipping fee at the Landfill. These two factors combined to drive Rhode Island-generated waste that had at one time been shipped to Massachusetts facilities back to the Landfill for disposal. The second key difference is that there is much less data characterizing commercial recycling than municipal recycling. The reasons for these differences are straightforward; RIRRC has no statutory or regulatory control over the flow of commercial waste, and so the quantities that are disposed at the Landfill are a function of a number of factors, including the regional disposal marketplace and RIRRC pricing and contract management decisions. Commercial recycling occurs in a non-centralized fashion making data difficult to come by.

5-2-2-1 Disposal

As a result of these differences, the estimation of the current status of CSW management differs from that for municipal waste in a number of aspects. Figure 171-5-2 shows the quantities of CSW disposed at the Landfill annually from 1993 through 2005. This graph is designed to show the range of quantities that have been disposed at the Landfill in the recent past. The graph shows that in 1993, when the annual disposal of CSW at the Landfill hit its low point, more than half of the CSW generated in Rhode Island was being disposed of at facilities other than the Landfill, mostly in Massachusetts at the Fall River Landfill and the Semass waste-to-energy facility, but also with significant tonnage being disposed of at the Plainville and East Bridgewater landfills and the Millbury waste-to-energy plant.

With the Landfill CSW tipping fee holding relatively stable at between \$37-\$39.50 per ton from 1992 through 1998 and tipping fees in Massachusetts climbing during this same period through the \$50 and \$60-per-ton levels, Rhode Island-generated waste that had previously been sent to facilities in Massachusetts for disposal was increasingly diverted to the Landfill. This trend was accentuated with the closure of major disposal facilities in Massachusetts proximate to Rhode Island, beginning with the closure of the East Bridgewater landfill in 1996, disposal restrictions imposed on the Fall River landfill in late 1997, the closure of the Plainville landfill in the spring of 1998, and the disappearance of capacity availability at the Seamass and Millbury waste-to-energy plants over the second half of the 1990s. The loss of disposal capacity availability, and the widening disposal cost differential also served to attract Massachusetts waste to the Landfill, resulting in peak CSW disposal of more than 700,000 tons in 1998. In order to conserve disposal capacity at the Landfill, the State and RIRRC sought to stem this rising tide of out-of-state waste by suing the major trash haulers involved. CSW disposal fell off sharply beginning in 1998 when the major national hauling firms settled these lawsuits brought against them by the State by executing consent

agreements that they would no longer deliver out-of-state waste to the Landfill. However, there is no way of being certain that some out-of-state waste is not still “leaking” into the Landfill. Finally, the graph shows that since 1999, the disposal of CSW has for the most part increased gradually through 2005 that reflects the increase in waste generation that has been observed nationally. This increase is proportionate to Rhode Island employment and is included in the calculation of the 1.24 tons per capita per year waste generation rate previously noted for total Rhode Island waste. It should be noted that the 1.31 tons per capita per year national waste generation rate estimated by BioCycle includes the categories of waste classified in Rhode Island as municipal solid waste and commercial solid waste.

The difference between the way Rhode Island and the EPA report solid waste results in a Rhode Island per capita waste generation rate that appears to be much higher than the 2003 national per capita waste generation rate of 0.8 tons annually reported by EPA. The EPA figure is really a per capita MSW generation rate and it is important to remember that the EPA does not include C&D or industrial discards in its definition of MSW. On the other hand, the Rhode Island per capita waste generation rate is calculated based on total solid waste, which does include C&D and industrial discards. RIRRC does not track the Landfill disposal of C&D as a discrete category of waste. However, the EPA reports that in 2003, C&D represented 37 percent of the combined MSW and C&D national waste streams. If the same C&D percentage is applied to the Rhode Island total waste stream, the state’s per capita MSW generation rate would be about 0.94, a figure that cannot be properly compared to the EPA figure because it still includes industrial waste while EPA’s figure does not.

However, a more important reason for using a great deal of caution in comparing Rhode Island and national figures is that Rhode Island figures are by and large based on actual disposal data and the national figures are almost entirely based on derived estimates from input models.

It can be seen from Figure 171-5-2 that the increase in the disposal of CSW has been more moderate over the past five years than the relatively sharper increase in the disposal of municipal waste over the same period.

Table 171-5-2 2005 Commercial Sector Waste Handled By RIRRC

	RIRRC	Composition	Target
Landfilled	711,709	63.1%	40.6%
Solid Waste	701,477	62.2%	
Sludge	10,231	0.9%	
		0.0%	
Recycled	29,195	2.6%	25.0%
Composted/Chipped	20,250	1.8%	3.1%
Recycled	8,945	0.8%	21.9%
		0.0%	
Beneficial Reuse	387,756	34.4%	34.4%
Tires - Incineration	1,555	0.1%	0.1%
Cover Materials	386,201	34.2%	34.2%
C&D Screenings	277,158	24.6%	24.6%
Ash	45,178	4.0%	4.0%
Soils	48,685	4.3%	4.3%
ASR Fines *	45	0.0%	0.0%
Sweepings	15,136	1.3%	1.3%
Total	1,128,659	100.0%	100.0%
<i>*Auto Shredder Residue</i>			

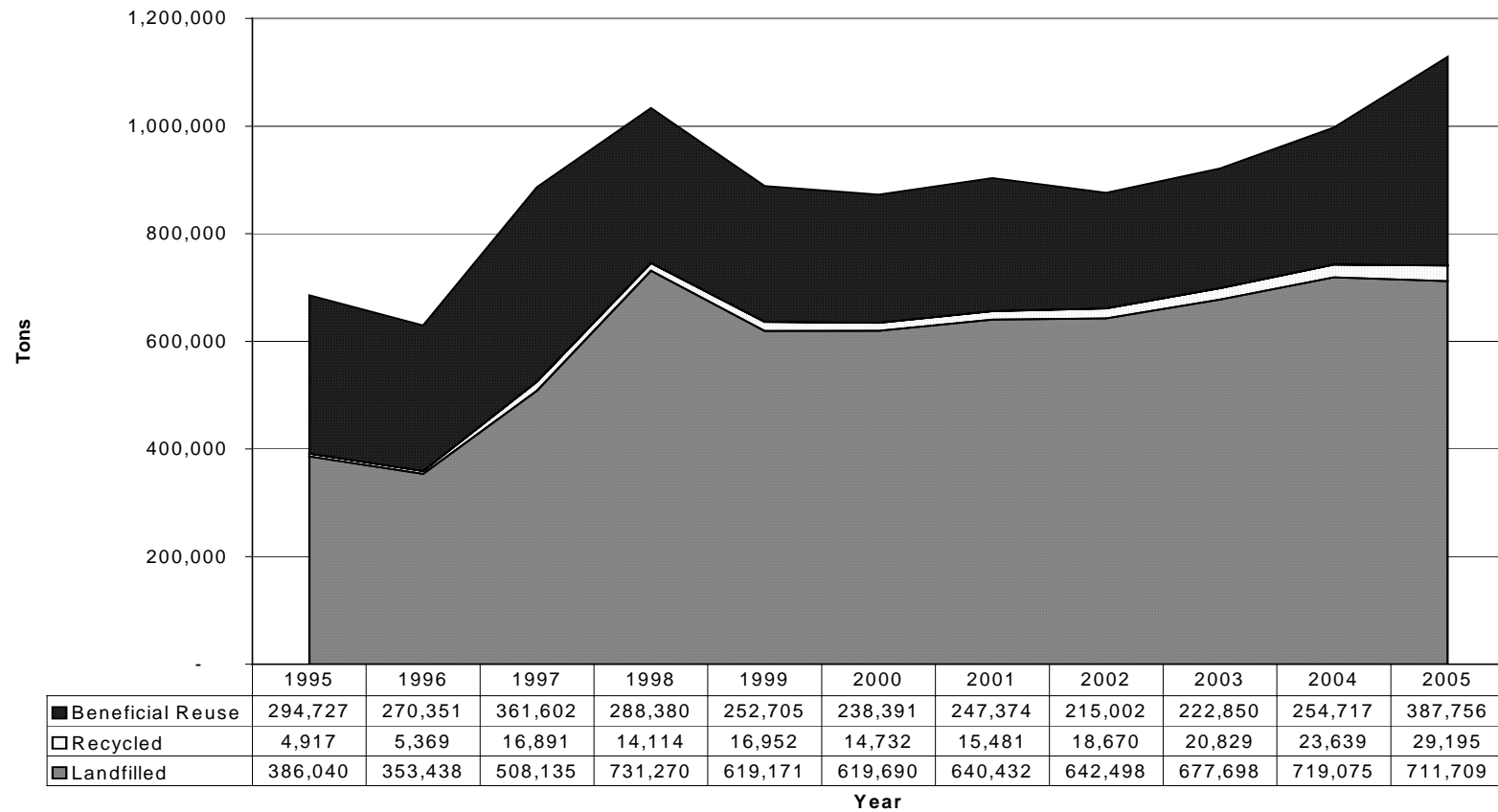
These patterns and observations must be turned into an estimate of the current status of CSW disposal to use as a starting point for projections. For the purposes of these projections, 2005 is considered to be representative of current conditions. There are several key points in support of this assumption. As a result of the combination of the disposal capacity market factors referenced above, it can be confidently assumed that virtually 100 percent of the CSW generated within the state is disposed of at the Landfill, a situation that has existed for about the past five years. Moreover, because the major publicly-owned national hauling firms have signed consent decrees to not bring out-of-state waste to the Landfill, it is probable that there will be no new major sources of waste for disposal at Central. In other words, the Landfill's natural watershed has been established and all potential sources of supply within the watershed have not only been identified as shipping to the Landfill for disposal, they have been characterized as to tonnage. Furthermore, with the per-capita waste generation rate and the state's population growing and expected to continue growing (although only slightly), a gradual annual increase in tonnage generated can be confidently forecast. This conclusion is supported by the data that show a steady but moderate increase in total disposal over the past four years. Therefore, it can be expected that if the regional disposal market and marketplace remains relatively unchanged, disposal levels at the Landfill will continue at between 1,100,000 and 1,250,000 tons annually for the next several years. There is no reason to believe at this time that either new disposal capacity in the region will be brought on line or that disposal costs in the region will fall. Consequently, it can be further expected that modifications to the solid waste tonnage disposed of at the Landfill will be a function of 1) improved recycling and other diversion strategies, 2) the decision to ship Rhode Island waste to distant disposal sites via rail haul, or 3) changes (increases) in the Landfill tipping fees, all three being decisions under the control of the RIRRC. ~~In the event that waste is shipped to out-of-state disposal in the future for the purposes of conserving~~

~~capacity in the Landfill for use by the cities and towns, it would necessarily have to be CSW precisely because the CSW tipping fee is higher than the municipal tipping fee. This action could nevertheless result in a negative economic impact for municipalities because while they would gain landfill capacity, the financial foundation that has been provided by CSW for nearly 25 years would be lost.~~

During the base year of 2005, about 711,709 tons of CSW were disposed of at the Landfill. This quantity is used as the starting point for making projections of CSW disposal under two broad, general scenarios as follows: 1) implementation of the commercial recycling and composting actions made in this Plan in order to achieve the diversion of the maximum amount of CSW from landfilling; and 2) maintenance of the status quo in recycling/composting programs and disposal operations by RIRRC which does not implement any of the actions contained in this Plan.

5-2-2-2 Recycling

The estimate described above is for the amount of CSW remaining after recycling. The only centralized facilities for the recycling of CSW are located at RIRRC's waste management complex in Johnston. However, since there is no comprehensive, statewide commercial recycling program similar to the municipal recycling program and since there is no centralized, comprehensive and integrated source of data for commercial recycling similar to that which exists for the municipal recycling program, it is more difficult to determine the quantity of CSW recycled than for municipal waste. Because of the lack of data, an estimate of commercial recycling was made based on general knowledge of commercial recycling in New England, the various types of commercial recycling, including the recycling of construction and demolition debris, performed at the RIRRC Johnston complex, anecdotal information about commercial recycling in Rhode Island, and discussions with major trash haulers. In the base year of 2005, a minimum of about 416,950 tons of material extracted from the CSW stream were either marketed by RIRRC and private firms for recycling, used as landfill cover material, or used for landscaping and slope grooming purposes by RIRRC at its Johnston complex. The types of CSW diverted from disposal and used as alternative landfill cover material includes such materials as processed oil-contaminated soils, screened street sweepings, tire and sludge incinerator ash residues, foundry sand, a limited quantity of dredge spoils, C&D debris, and various other miscellaneous materials that would in the past have been disposed of but for which re-uses have developed. These materials which were utilized for landfill cover, landscaping, or construction purposes at the Landfill complex are included under the term "beneficial reuse" in this Plan. They are included in the total of CSW recycled because their likely alternative disposition would have been disposal in the Landfill. In addition, the DEM reported that in 2002, approximately 40,000 tons of recyclables were marketed from licensed CSW management facilities. These estimates do not include the tonnages of various types of papers and textiles marketed for recycling by the traditional scrap industry.

Figure 171-5-2 Commercial Sector Material Delivered to RIRRC By Year⁵

Note: Figures include all material delivered to RIRRC from non-municipal sources. Recycled include scrap metal, compostables and MRF materials. Beneficial Reuse include Alternative Cover, and Tires.

⁵ This graph shows only the total CSW delivered to RIRRC facilities. Total CSW generation within the State also includes CSW recycled from transfer stations, leaf and yard waste composted at facilities other than RIRRC'S and the material recycled by private sector hauling and waste management firms.

5-3 PROJECTIONS OF WASTE GENERATION, RECYCLING, COMPOSTING, AND DISPOSAL

With the starting points for the projections of municipal and commercial waste quantities established, the projections can be performed. There are numerous factors that can affect the amounts of waste generated, recycled, composted, and disposed. These projections take into account the most significant of those factors. Waste generation is affected primarily by population, employment, and trends in waste generation rates per capita or per employee. Recycling is affected by collection and processing costs and logistics, revenue potential, future marketability, and the ability and willingness of people to perform the tasks necessary to recycle materials. Composting is affected primarily by the ability to collect compostable material, establishment of the sites or facilities necessary to compost the material, and the willingness of the public to comply with the requirements for separation of the material. All of these factors are considered in the projections described below.

5-3-1 Municipal Waste Projections

The key assumptions utilized in the projection of municipal waste diversion are shown in Tables 171-5-3, -4, and -5. The 2005 municipal waste generation rate was estimated to be approximately 0.56 tons per person per year. This rate is projected to increase 0.5 percent per year from 2005 through 2025. This increase in rate is significantly lower than the long-term historical average and reflects the trend of increasing per-capita waste generation rates observed nationally.

The projected per-capita waste generation rates are applied to the statewide population projected by the Statewide Planning Program. The projected population levels and the resulting projections of municipal waste generation are shown in Table 171-5-4 and Table 171-5-5, respectively. It can be seen that municipal waste generation is projected to increase from 594,920 tons in 2005 to 698,046 tons in 2025.

Table 171-5-3 also shows material-by-material percentages of composition of the municipal waste stream and material-by-material recycling projections for 2010. The composition fractions are based on the 1990 Waste Composition Study. The projected recycling rates for 2010 on a material-by-material basis were developed as a result of observations made of actual recycling rates over the past 15 years with projections being made based on the expected performance of the Maximum Recycling Program, improved waste prevention and increased leaf and yard waste diversion assuming that the actions to follow in Part 6 be implemented. The projected rates reflect diversion from landfilling and are based on the recycling tonnages recorded at RIRRC facilities. These projections are net of any residue created during processing. Materials diverted through scavenging are regarded as part of the background situation.

Table 171-5-5 presents two scenarios for municipal waste projections. The first assumes that actions described in this Plan (see Part 6) for increasing the diversion of municipal sector waste, such as the implementation of user fee systems, increased composting, the adoption of landfill bans, and improved enforcement of and compliance with the existing recycling statutes are fully implemented. The second scenario assumes maintenance of the status quo in recycling/composting programs and disposal operations. In other words, the rates of

disposal and diversion stay at the same levels as seen in 2005. Under the full implementation scenario, recycling and diversion levels are projected by imposing the assumptions on the levels achievable by 2010 shown in Table 171-5-3. First, an assumed increase in waste prevention was assumed to phase in gradually from 2005 through 2010. Next, the year-to-year projections of diversion and recycling for the first scenario are calculated by imposing a gradual increase to the achievable rates by the year 2010 and continuing those rates through 2025. On the other hand, the status quo rates of recycling and diversion are calculated by simply applying the rates from 2005 to the total projected waste generation for each year. Graphical depictions of each scenario can be found in Figure 171-5-3 and Figure 171-5-4.

Table 171-5-3 Municipal Waste Composition and Diversion Assumptions

WASTE COMPONENT		Municipal Waste Composition	Estimated % of Generation Recovered in 2005	Assumed Recoverable By 2010
PAPER				
NEWSPAPER		10.4%		8.0%
OFFICE PAPER		2.5%		0.6%
CARDBOARD/KRAFT PAPER		5.9%		3.0%
MAGAZINES/GLOSSY PAPER		2.2%		1.5%
CHIPBOARD		3.6%		1.0%
OTHER PAPER		9.0%		0.0%
SUBTOTAL		33.6%	8.9%	14.1%
PLASTIC				
PET		0.5%		0.5%
HDPE		0.4%		0.4%
RIGID PLASTICS		1.0%		
FILM PLASTICS		3.5%		0.0%
OTHER PLASTICS		3.3%		
SUBTOTAL		8.7%	0.7%	0.9%
YARD DEBRIS				
LEAVES		2.9%		2.8%
STUMPS		0.3%		0.0%
GRASS/OTHER		6.7%		6.2%
FINES		4.0%		2.0%
SUBTOTAL		13.9%	6.9%	11.0%
GLASS				
CONTAINERS		5.0%		3.0%
OTHER GLASS		0.1%		0.0%
SUBTOTAL		5.1%	2.3%	3.0%
METALS				
TIN-COATED CANS		1.9%		1.0%
OTHER FERROUS METALS		2.4%	0.7%	2.4%
ALUMINUM CONTAINERS		0.7%		0.4%
OTHER ALUMINUM		0.2%		0.1%
OTHER NON-FERROUS		0.2%		0.1%
SUBTOTAL		5.4%	1.4%	4.0%
OTHER WASTES				
TEXTILES		5.0%		1.5%
DISPOSABLE DIAPERS		3.1%		0.0%
OTHER ORGANICS		23.2%		0.2%
INORGANICS ²		1.1%	0.1%	0.2%
TIRES		0.2%	0.1%	0.1%
SUBTOTAL		32.6%	0.23%	2.0%
HOUSEHOLD HAZ. WASTE		0.5%	0.05%	0.2%
TOTAL		99.8%	20.46%	35.0%
Projection Category				
MRF Recycling		55.4%	12.60%	21.1%
Compost ¹		37.1%	6.91%	11.2%
White Goods and Scrap Metal		2.4%	0.66%	2.3%
Tires		0.2%	0.10%	0.1%
Other		4.7%	0.18%	0.4%
¹ Includes Yard Debris and Other Organics.				
² Inorganics is assumed to include consumer electronics and mattresses				

Table 171-5-4 Population Projections

Year	Population		Employment	
	Official SPP Projection	Plan Projection	SPP Projected Working Age Population	Employment Projection (78% of Working Age Pop.)
2000	1,048,319	1,048,319	613,301	484,200
2001		1,051,143		486,148
2002		1,053,968		488,096
2003		1,056,792		490,044
2004		1,059,617		491,992
2005	1,062,441	1,062,441	633,256	493,940
2006		1,064,793		496,769
2007		1,067,144		499,598
2008		1,069,496		502,427
2009		1,071,847		505,257
2010	1,074,199	1,074,199	651,392	508,086
2011		1,077,722		508,868
2012		1,081,245		509,650
2013		1,084,767		510,432
2014		1,088,290		511,214
2015	1,091,813	1,091,813	656,405	511,996
2016		1,095,743		510,383
2017		1,099,673		508,770
2018		1,103,604		507,156
2019		1,107,534		505,543
2020	1,111,464	1,111,464	646,064	503,930
2021		1,114,823		501,343
2022		1,118,182		498,755
2023		1,121,542		496,168
2024		1,124,901		493,580
2025	1,128,260	1,128,260	629,478	490,993

Table 171-5-5 Municipal Waste Generation and Diversion Projections

		With Pay As You Throw Implementation and Yard Debris Ban										Status Quo									
Year	Per Capita Waste Generation ¹	Potential Generation (Before Source Reduction)	Waste Prevention ²	Total Generation	Landfilled	MRF Recycling	Composting	White Goods	Tires	Other Recycling	% Diversion	Potential Generation (Before Source Reduction)	Waste Prevention ²	Total Generation	Landfilled	MRF Recycling	Composting	White Goods	Tires	Other Recycling	% Diversion
2005	0.5600	594,920	-	594,920	467,162	78,931	43,260	4,119	644	803	21.5%	594,920	-	594,920	467,162	78,931	43,260	4,119	644	803	21.5%
2006	0.5628	599,218	5,992	593,226	450,871	87,939	47,021	5,697	634	1,063	24.8%	599,218	-	599,218	471,346	79,501	43,573	4,149	649	809	21.4%
2007	0.5656	603,544	12,071	591,473	434,622	96,886	50,755	7,265	624	1,321	28.0%	603,544	-	603,544	474,749	80,075	43,887	4,179	654	815	21.4%
2008	0.5684	607,898	18,237	589,661	418,420	105,767	54,460	8,823	614	1,578	31.2%	607,898	-	607,898	478,174	80,652	44,204	4,209	658	821	21.4%
2009	0.5712	612,281	24,491	587,790	402,268	114,581	58,136	10,369	604	1,832	34.3%	612,281	-	612,281	481,622	81,234	44,523	4,240	663	827	21.4%
2010	0.5741	616,693	30,835	585,858	380,515	123,323	65,616	13,475	586	2,343	38.3%	616,693	-	616,693	485,092	81,819	44,843	4,270	668	833	21.4%
2011	0.5770	621,809	31,090	590,718	383,671	124,346	66,160	13,587	591	2,363	38.3%	621,809	-	621,809	489,116	82,498	45,215	4,306	673	840	21.4%
2012	0.5799	626,960	31,348	595,612	386,850	125,376	66,709	13,699	596	2,382	38.3%	626,960	-	626,960	493,169	83,181	45,590	4,341	679	847	21.4%
2013	0.5827	632,148	31,607	600,541	390,051	126,414	67,261	13,812	601	2,402	38.3%	632,148	-	632,148	497,249	83,870	45,967	4,377	685	854	21.4%
2014	0.5857	637,372	31,869	605,503	393,274	127,458	67,816	13,927	606	2,422	38.3%	637,372	-	637,372	501,358	84,563	46,347	4,413	690	861	21.4%
2015	0.5886	642,632	32,132	610,501	396,520	128,510	68,376	14,042	611	2,442	38.3%	642,632	-	642,632	505,496	85,261	46,730	4,450	696	868	21.4%
2016	0.5915	648,170	32,409	615,762	399,937	129,618	68,965	14,163	616	2,463	38.3%	648,170	-	648,170	509,852	85,996	47,132	4,488	702	875	21.4%
2017	0.5945	653,748	32,687	621,060	403,379	130,733	69,559	14,284	621	2,484	38.3%	653,748	-	653,748	514,240	86,735	47,538	4,527	708	883	21.4%
2018	0.5975	659,365	32,968	626,396	406,844	131,856	70,156	14,407	626	2,506	38.3%	659,365	-	659,365	518,658	87,481	47,946	4,566	714	890	21.4%
2019	0.6005	665,021	33,251	631,770	410,335	132,988	70,758	14,531	632	2,527	38.3%	665,021	-	665,021	523,107	88,231	48,358	4,605	720	898	21.4%
2020	0.6035	670,718	33,536	637,182	413,850	134,127	71,364	14,655	637	2,549	38.3%	670,718	-	670,718	527,589	88,987	48,772	4,644	726	906	21.4%
2021	0.6065	676,109	33,805	642,303	417,176	135,205	71,938	14,773	642	2,569	38.3%	676,109	-	676,109	531,829	89,702	49,164	4,682	732	913	21.4%
2022	0.6095	681,537	34,077	647,460	420,525	136,290	72,516	14,892	647	2,590	38.3%	681,537	-	681,537	536,099	90,422	49,559	4,719	738	920	21.4%
2023	0.6126	687,002	34,350	652,652	423,898	137,383	73,097	15,011	653	2,611	38.3%	687,002	-	687,002	540,398	91,148	49,956	4,757	744	928	21.4%
2024	0.6156	692,505	34,625	657,880	427,293	138,484	73,683	15,131	658	2,632	38.3%	692,505	-	692,505	544,726	91,878	50,356	4,795	750	935	21.4%
2025	0.6187	698,046	34,902	663,144	430,712	139,592	74,272	15,252	663	2,653	38.3%	698,046	-	698,046	549,085	92,613	50,759	4,833	756	943	21.4%
2026	0.6218	703,064	35,153	667,911	433,808	140,595	74,806	15,362	668	2,672	38.3%	703,064	-	703,064	553,032	93,278	51,124	4,868	761	950	21.4%
2027	0.6249	708,114	35,406	672,709	436,924	141,605	75,343	15,472	673	2,691	38.3%	708,114	-	708,114	557,004	93,949	51,491	4,903	767	956	21.4%
2028	0.6280	713,198	35,660	677,538	440,061	142,622	75,884	15,583	678	2,710	38.3%	713,198	-	713,198	561,003	94,623	51,861	4,938	772	963	21.4%
2029	0.6312	718,314	35,916	682,398	443,218	143,645	76,429	15,695	682	2,730	38.3%	718,314	-	718,314	565,028	95,302	52,233	4,974	778	970	21.4%
2030	0.6343	723,464	36,173	687,291	446,395	144,675	76,977	15,808	687	2,749	38.3%	723,464	-	723,464	569,079	95,985	52,607	5,010	784	977	21.4%

¹Based on estimated per capita waste generation from Table 171-5(1) for 2005 and is assumed to increase by 0.5% each year thereafter.

² Assumed in the 2005 figure is an existing base level of waste prevention achieved through public awareness efforts and distribution of backyard composters. Waste prevention is assumed to incrementally increase to 5% of potential municipal generation by 2010 from the base level under the scenario where the plan's recommendations are fully implemented.

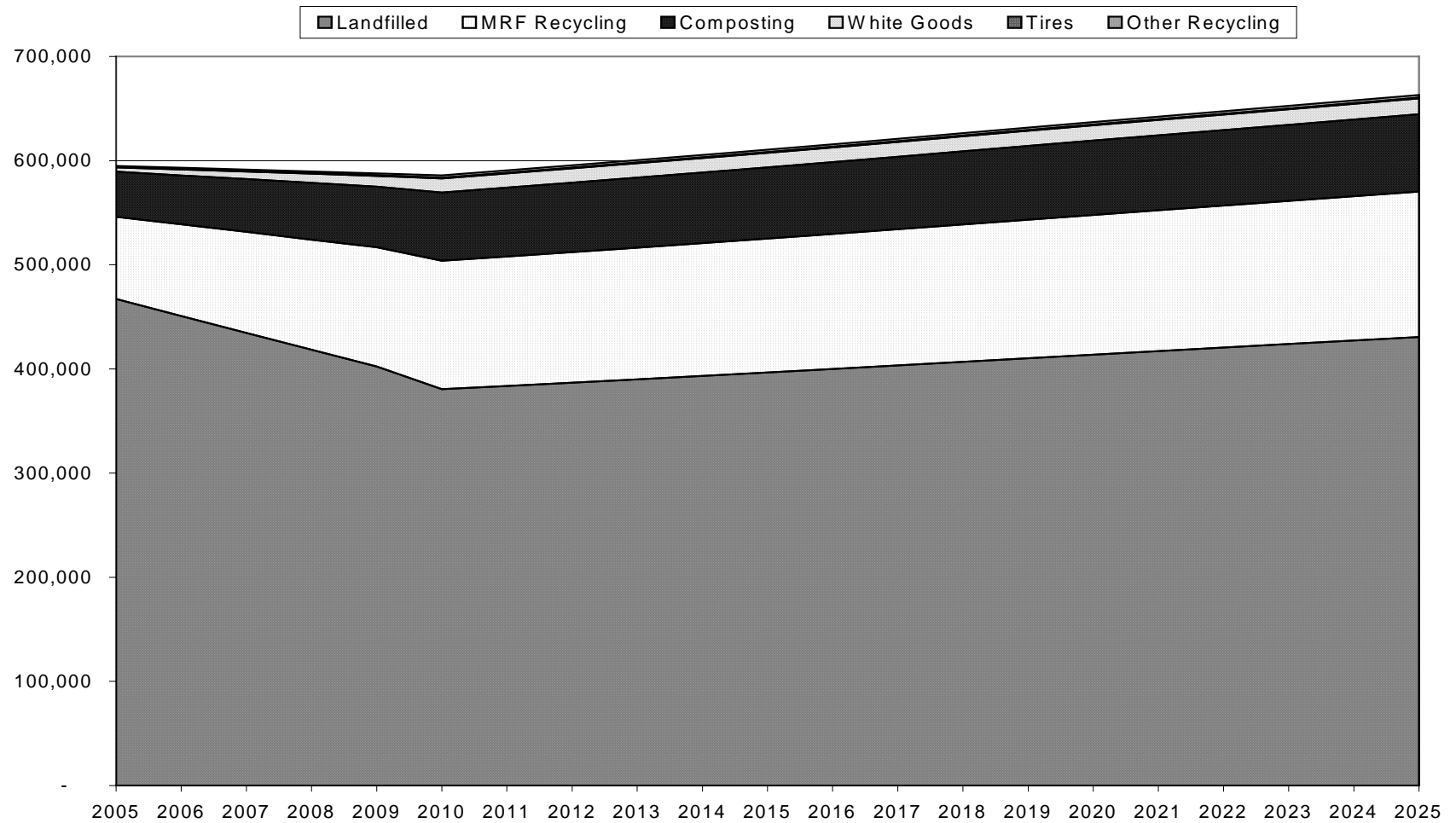
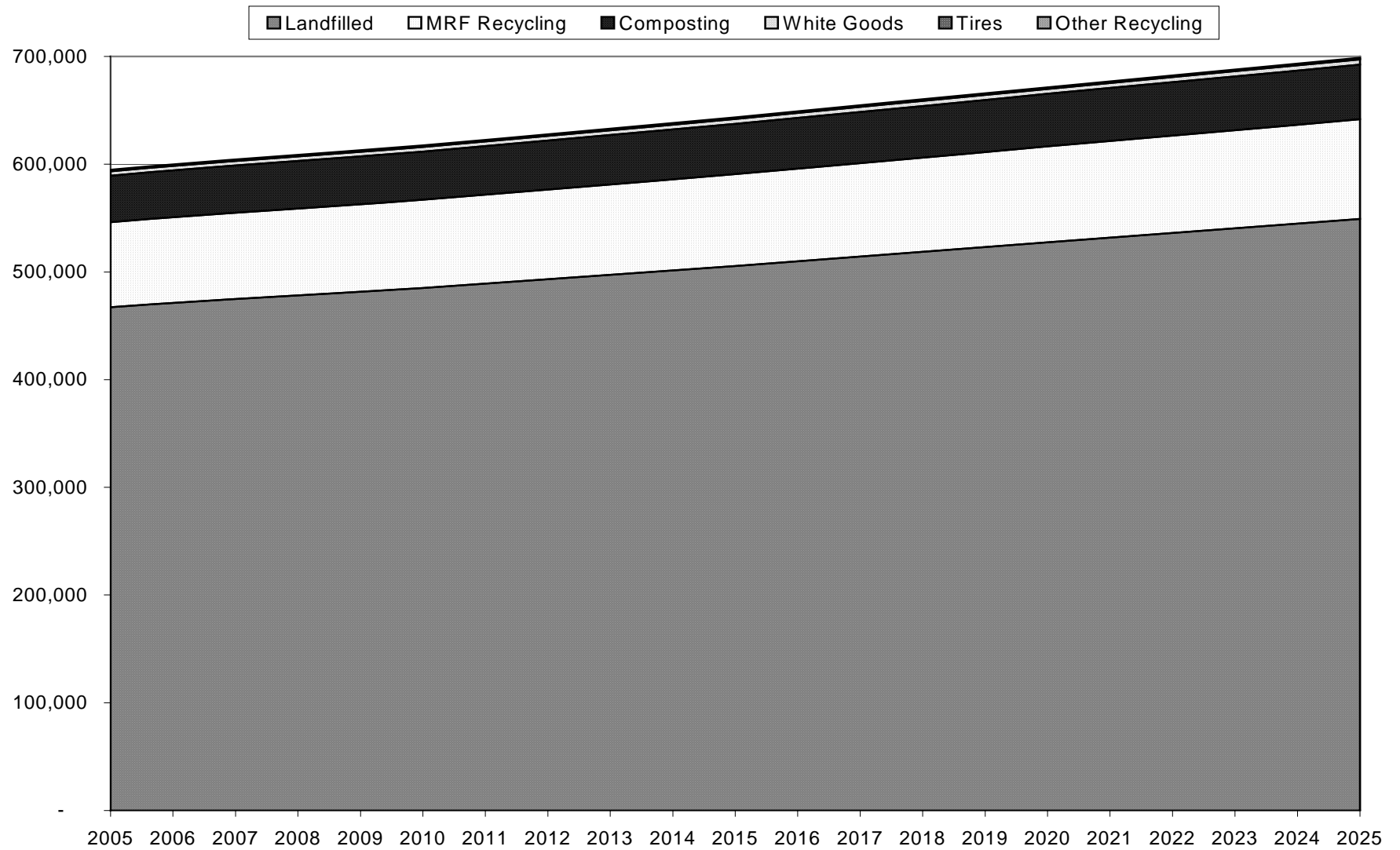
Figure 171-5-3 Municipal Sector Waste and Recycling Projection - Actions Implemented

Figure 171-5-4 Municipal Sector Waste and Recycling Projection – Status Quo



5-3-2 Commercial Waste Projections

CSW generation is projected in the same fashion as municipal waste generation, with the only difference being that employment is used as the key factor instead of population. In 2005, 1,128,659 tons of CSW were generated, with about 416,950 tons of the total recycled, composted, or beneficially reused and about 711,709 tons disposed (see Table 171-5-2). With an estimated statewide employment of 496,769 in 2005, (see Table 171-5-6), the CSW generation rate is 2.29 tons per employee per year. This rate appears to be much higher than the 1.26 tons per capita commercial waste generation reported in the 1996 Plan but this appearance is deceptive because the 2005 CSW generation rate is (and all those going forward will be) calculated on the basis of the total amount of CSW generated while the 1996 rate was calculated on the basis of the amount of CSW landfilled, a much smaller number. Like the municipal sector projection, this rate is assumed to increase by 0.5 percent per year through 2025.

The CSW generation rate is then applied to the projected statewide employment for each year, shown in Table 171-5-6. The projected employment is based on the projected working age population (between ages 19 and 64). Population projections by age category were obtained from the Statewide Planning Program for the years 2000, 2005, 2010, 2015, 2020, and 2025. An arbitrary 78 percent rate of employment for the working age population was applied to these years. Finally, employment projections for years occurring between those with actual projections available from the Census Bureau were estimated by calculating even increments of the total change between consecutive available periods. CSW generation is projected to increase from 1,128,659 tons in 2005 to 1,239,610 tons in 2025. It is very important to remember that these figures represent the total amount of CSW generated in the state and that this total includes: 1) recyclable materials extracted from the waste stream and marketed for reuse or remanufacturing; 2) leaf and yard debris that is composted; and 3) a very large quantity of construction and demolition debris, which has been used beneficially as landfill cover material and which is projected to continue to be used in this way. C&D used as landfill cover material for the most part replaces the use of virgin earthen materials for this purpose.

The figure of 29,195 tons of commercial recyclables reported for 2005 represents the total tonnage of recyclables delivered to the RIRRC's facilities from commercial sources or extracted from CSW processed at the Tipping Facility. Firms in the commercial recycling business did not provide data concerning the quantities or types of recyclables they handle. The annual growth in the tonnage of commercial recyclables shown in Table 171-5-6 reflect the increasing effectiveness of the Tipping Facility in extracting recyclables, predominantly wood, corrugated cardboard, and metal from the CSW stream that is delivered to that facility.

Because there is significantly less data available concerning recyclables in the CSW stream and concerning commercial recycling in general than is available for municipal recycling, the projected tonnages of commercial recyclables shown in Table 171-5-6 are also based on conservative estimates of the quantities of recyclable materials processed and marketed by private firms that are often reluctant to divulge data concerning the quantities of recyclable

materials that they process and market. Large but indeterminate quantities of various types of waste paper and old corrugated cardboard are handled by private industry outside RIRRC's system. It should also be noted that an indeterminate quantity of the recyclable materials processed by Rhode Island firms is generated outside the state and delivered to these firms for processing. As a result, there is a larger degree of unavoidable uncertainty built into the commercial recycling projections. Since virtually all municipal recyclables are handled by the RIRRC at the MRF, municipal recycling projections are founded on much more extensive data than the commercial recycling projections that must be made on the basis of observations and the relatively small but not clearly delineated fraction of commercial recyclables handled by RIRRC. Nevertheless, it can be projected that the level of commercial recycling can potentially reach 25 percent by 2010 and could well exceed that percentage particularly if major advances are made concerning bulk food waste composting, provided that the management and regulatory programs recommended in this Plan are implemented and maintained. This projection assumes the CSW tipping fee continues to bear the same relationship to regional disposal market prices that it did in 2005. Raising the CSW tipping fee to bring it closer to or equal to the regional disposal market rate could result in an increase in commercial recycling but it would also drive CSW to disposal facilities other than the Landfill.

The Major Project Sub-Committee of RIRRC's Board of Commissioners initiated an investigation of a major organics project in 2005, which, if implemented could divert significant amounts of waste from landfilling. Nevertheless, the commercial recycling rate was held stable at 25 percent because of the lack of data currently available concerning this project and commercial recycling in general.

The compost tonnages shown in Table 171-5-6 are for compost produced at the Landfill complex and commercial composting that occurs at private sector sites throughout the state. The compost tonnage increases shown from 2005 to 2010 reflect the increase in the quantities of commercial leaf and yard debris expected to occur when a ban on the landfill disposal of leaf and yard debris is implemented.

Table 171-5-6 Commercial Sector Solid Waste Generation Projections

Year	Employment	Tons Per Employee	Generation	With Recommendations Implemented				Status Quo			
				Landfill	Recycling	Compost	Other Beneficial ReUse	Landfill	Recycling	Compost	Other Beneficial ReUse
2005	493,940	2.29	1,128,659	711,709	8,945	20,250	387,756	711,709	8,945	20,250	387,756
2006	496,769	2.30	1,140,799	668,226	57,197	23,449	391,927	719,364	9,041	20,468	391,927
2007	499,598	2.31	1,153,033	623,705	106,484	26,715	396,130	727,078	9,138	20,687	396,130
2008	502,427	2.32	1,165,360	578,134	156,815	30,046	400,365	734,852	9,236	20,908	400,365
2009	505,257	2.33	1,177,782	531,500	208,205	33,445	404,632	742,685	9,334	21,131	404,632
2010	508,086	2.34	1,190,299	483,792	260,663	36,911	408,933	750,578	9,433	21,356	408,933
2011	508,868	2.35	1,198,092	486,959	262,370	37,153	411,610	755,492	9,495	21,496	411,610
2012	509,650	2.37	1,205,933	490,146	264,087	37,396	414,304	760,436	9,557	21,636	414,304
2013	510,432	2.38	1,213,822	493,353	265,815	37,641	417,014	765,411	9,620	21,778	417,014
2014	511,214	2.39	1,221,760	496,579	267,553	37,887	419,741	770,416	9,683	21,920	419,741
2015	511,996	2.40	1,229,747	499,825	269,302	38,135	422,485	775,453	9,746	22,063	422,485
2016	510,383	2.41	1,232,002	500,742	269,796	38,205	423,260	776,875	9,764	22,104	423,260
2017	508,770	2.43	1,234,249	501,655	270,288	38,274	424,032	778,291	9,782	22,144	424,032
2018	507,156	2.44	1,236,487	502,565	270,778	38,344	424,801	779,703	9,799	22,184	424,801
2019	505,543	2.45	1,238,716	503,471	271,266	38,413	425,567	781,109	9,817	22,224	425,567
2020	503,930	2.46	1,240,937	504,374	271,753	38,482	426,330	782,509	9,835	22,264	426,330
2021	501,343	2.47	1,240,739	504,293	271,709	38,476	426,261	782,384	9,833	22,261	426,261
2022	498,755	2.49	1,240,507	504,199	271,658	38,468	426,182	782,238	9,831	22,257	426,182
2023	496,168	2.50	1,240,242	504,091	271,600	38,460	426,091	782,070	9,829	22,252	426,091
2024	493,580	2.51	1,239,943	503,969	271,535	38,451	425,988	781,882	9,827	22,246	425,988
2025	490,993	2.52	1,239,610	503,834	271,462	38,441	425,874	781,672	9,824	22,240	425,874
2026	488,261	2.54	1,238,876	503,536	271,301	38,418	425,621	781,209	9,818	22,227	425,621
2027	485,528	2.55	1,238,103	503,221	271,132	38,394	425,356	780,721	9,812	22,213	425,356
2028	482,796	2.56	1,237,291	502,891	270,954	38,369	425,077	780,210	9,806	22,199	425,077
2029	480,063	2.58	1,236,440	502,545	270,768	38,342	424,784	779,673	9,799	22,184	424,784
2030	477,331	2.59	1,235,549	502,184	270,573	38,315	424,479	779,112	9,792	22,168	424,479

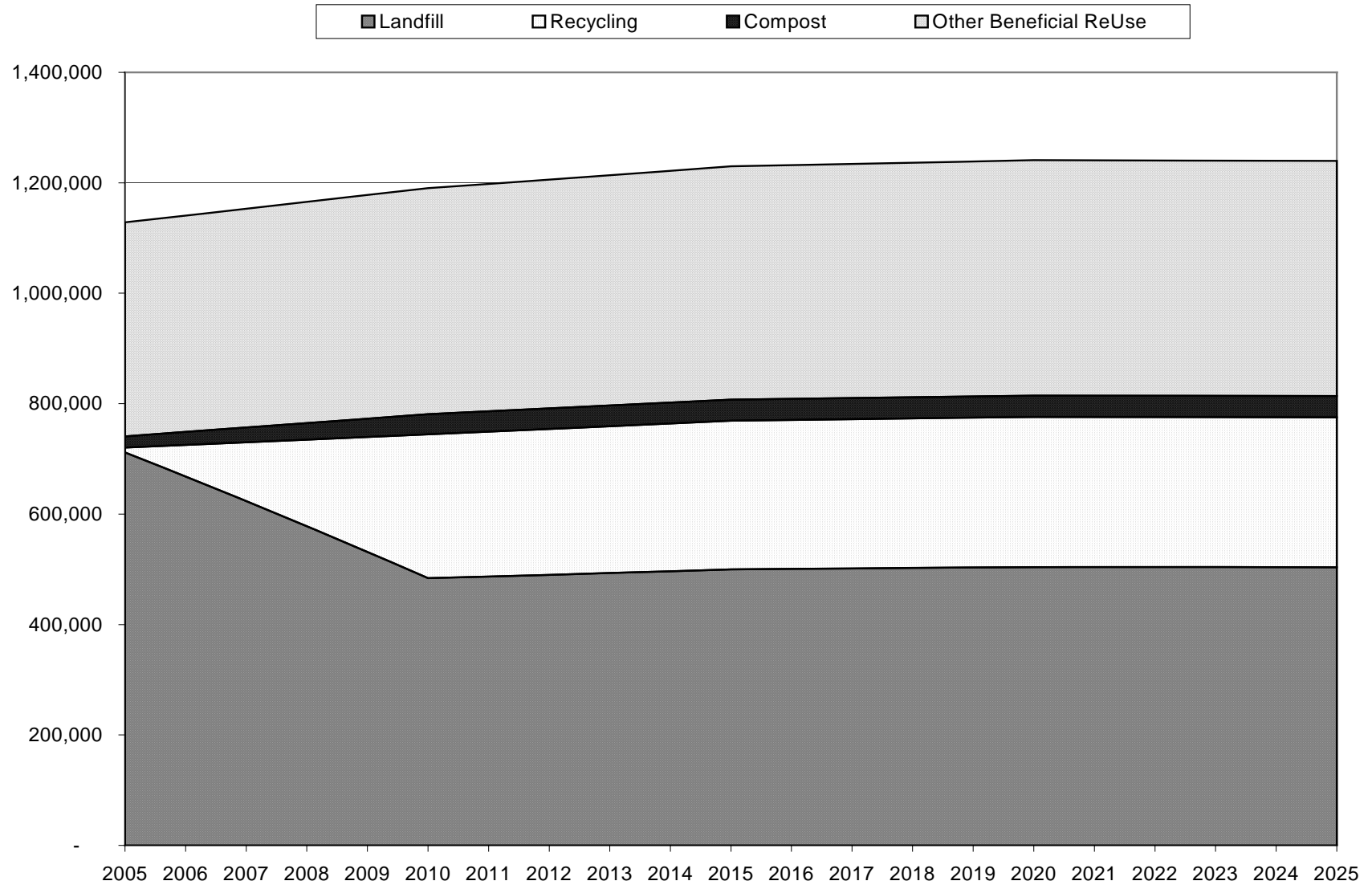
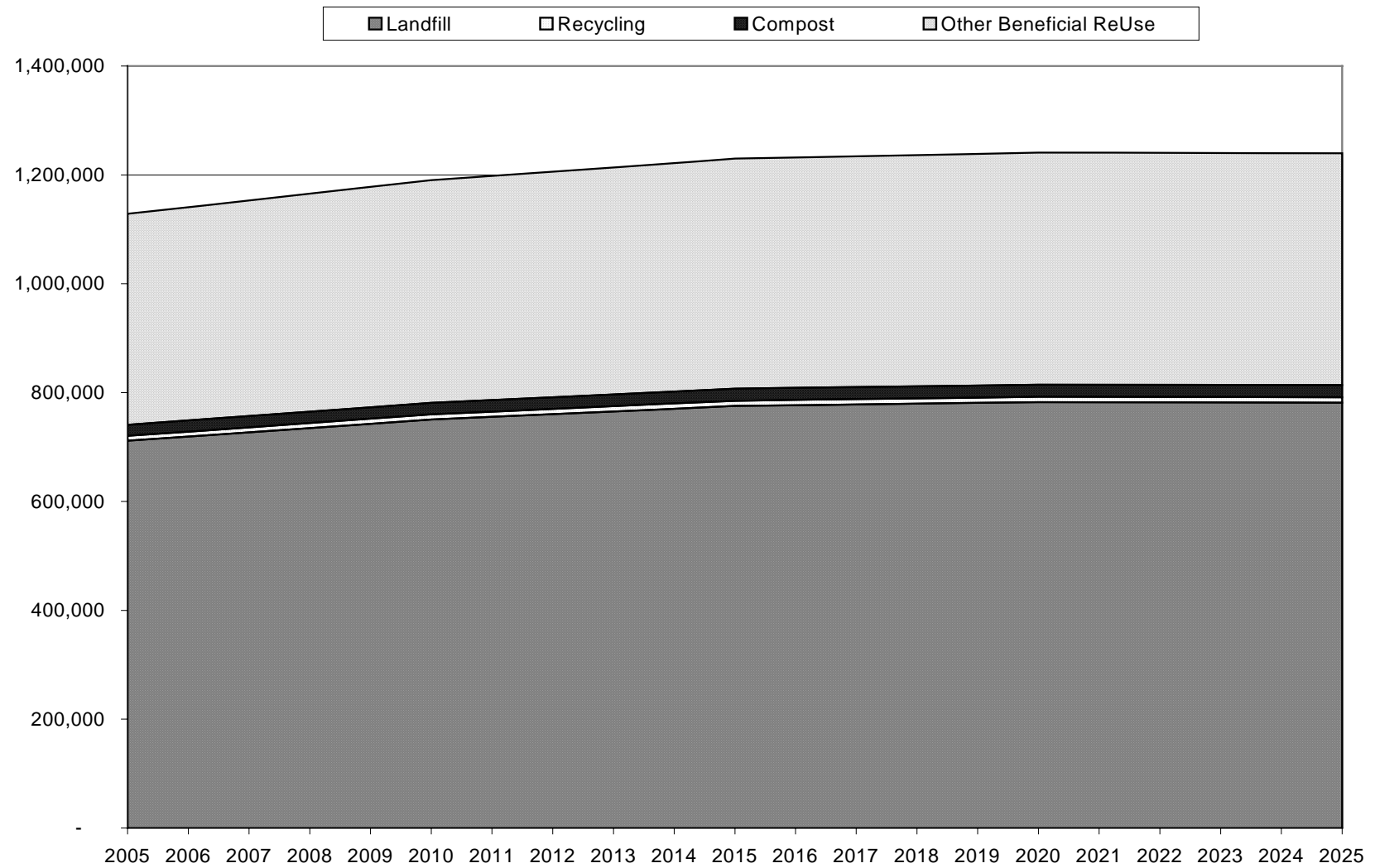
Figure 171-5-5 Commercial Sector Generation Projection – Actions Implemented

Figure 171-5-6 Commercial Sector Generation Projection – Status Quo

Although RIRRC plans to process more than 150,000 tons of C&D debris annually for use as landfill cover material, an unknown, and to-date undeterminable, quantity of C&D is shipped to out-of-state disposal by rail. Since the 1990 Solid Waste Composition Study estimates that C&D debris constitutes approximately 25 percent of the CSW stream, it can be deduced that possibly 75,000 tons of C&D are being shipped to out-of-state disposal annually by private waste management firms. Table 171-5-6 shows that in 2005, 387,756 tons of material were beneficially reused, with all of it being used as landfill cover material. Not all of this material was C&D debris; there were significant tonnages of tire incinerator ash/residue, sludge ash, oil-contaminated processed soil, and other waste materials that were put to use as landfill cover. It can be expected that, in the near term at least, an increasing tonnage of C&D will be shipped by rail to out-of-state disposal because the total cost of managing the C&D in this way compares favorably to the cost of delivering the material to the RIRRC in Johnston either for processing for use as cover material or as solid waste for disposal. Moreover, it is difficult to determine how much of the C&D currently shipped to out-of-state disposal is generated in Rhode Island and how much is generated in other states and delivered to Rhode Island firms for processing and rail shipment to landfills out of state for disposal.

Nevertheless, observation of the waste management industry and discussions with industry leaders leads to the conclusion that more than half of the C&D debris generated within Rhode Island is managed by the RIRRC.

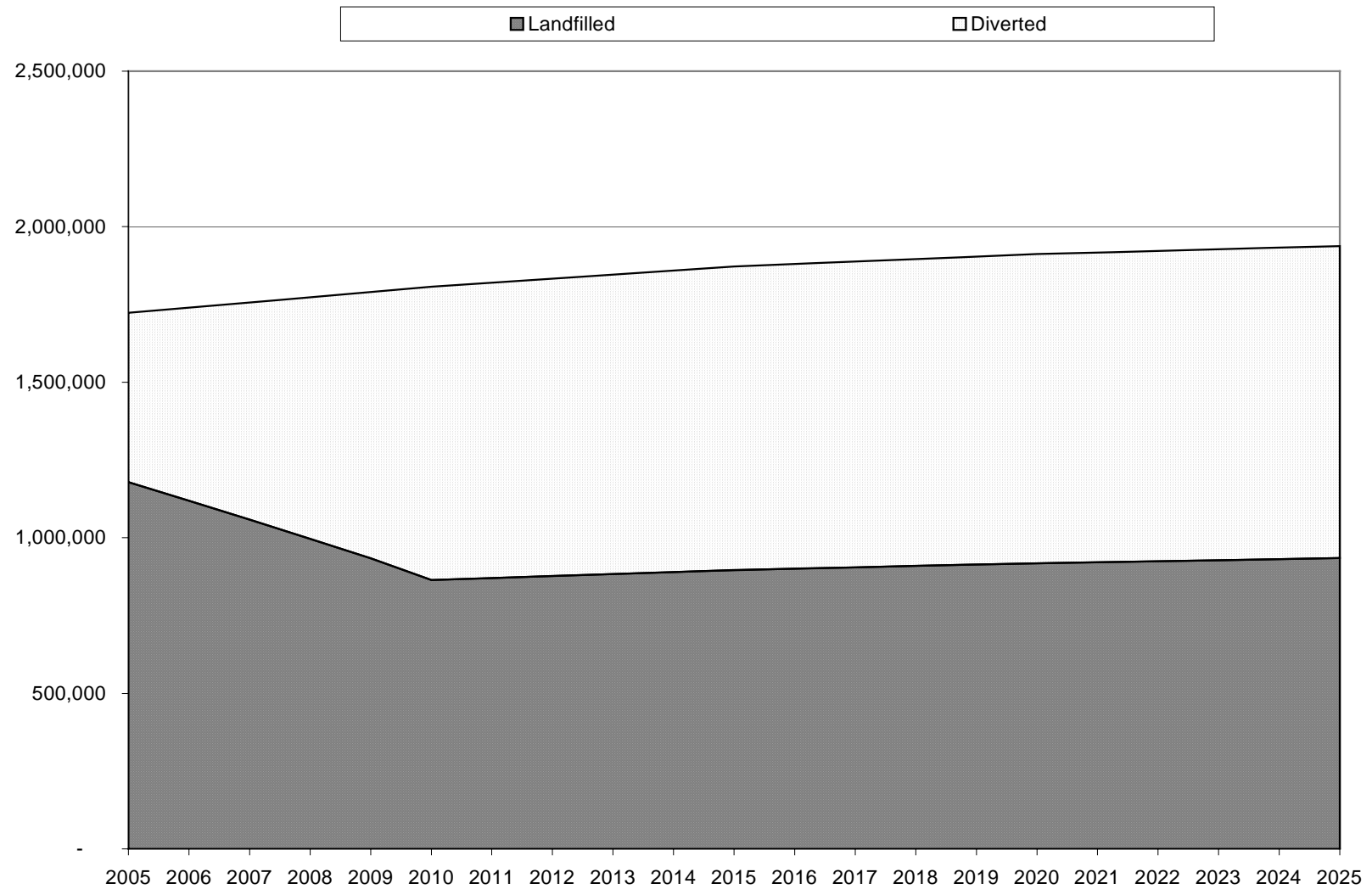
5-3-3 Combined waste

When the results of the municipal and commercial waste projections are combined, the levels of generation, recycling and disposal for the combined waste stream can be determined. These results are shown in Table 171-5-7, Figure 171-5-7 and Figure 171-5-8. Given these waste generation and diversion projections and the assumptions regarding remaining landfill capacity in Section 6-5, a comparison can be made of the expected landfill life under the current rates of disposal with the projected rates of disposal, assuming implementation of this plan. As shown in Figure 171-5-9, achieving the levels of waste diversion projected in this plan will add more than seven years of life to the Landfill.

Table 171-5-~~3~~7 Projected Combined Waste Stream

Year	With Recommendations Implemented		Business As Usual	
	Landfilled	Diverted	Landfilled	Diverted
2005	1,178,871	544,708	1,178,871	544,708
2006	1,119,097	620,921	1,190,710	550,116
2007	1,058,327	698,250	1,201,828	555,564
2008	996,554	776,705	1,213,026	561,054
2009	933,769	856,295	1,224,307	566,584
2010	864,307	942,685	1,235,670	572,155
2011	870,631	949,270	1,244,608	576,133
2012	876,996	955,897	1,253,605	580,135
2013	883,404	962,566	1,262,660	584,164
2014	889,853	969,279	1,271,775	588,218
2015	896,346	976,034	1,280,949	592,299
2016	900,679	979,493	1,286,727	594,321
2017	905,034	982,963	1,292,531	596,348
2018	909,409	986,442	1,298,360	598,381
2019	913,806	989,932	1,304,216	600,420
2020	918,223	993,432	1,310,098	602,464
2021	921,469	995,379	1,314,213	603,548
2022	924,724	997,320	1,318,336	604,628
2023	927,988	999,256	1,322,468	605,704
2024	931,262	1,001,186	1,326,609	606,775
2025	934,546	1,003,111	1,330,757	607,842

**Figure 171-5-7 Projected Combined Municipal and Commercial Sector
Solid Waste Landfilled - Actions Implemented**



**Figure 171-5-8 Projected Combined Municipal and Commercial Sector
Solid Waste Landfilled – Status Quo**

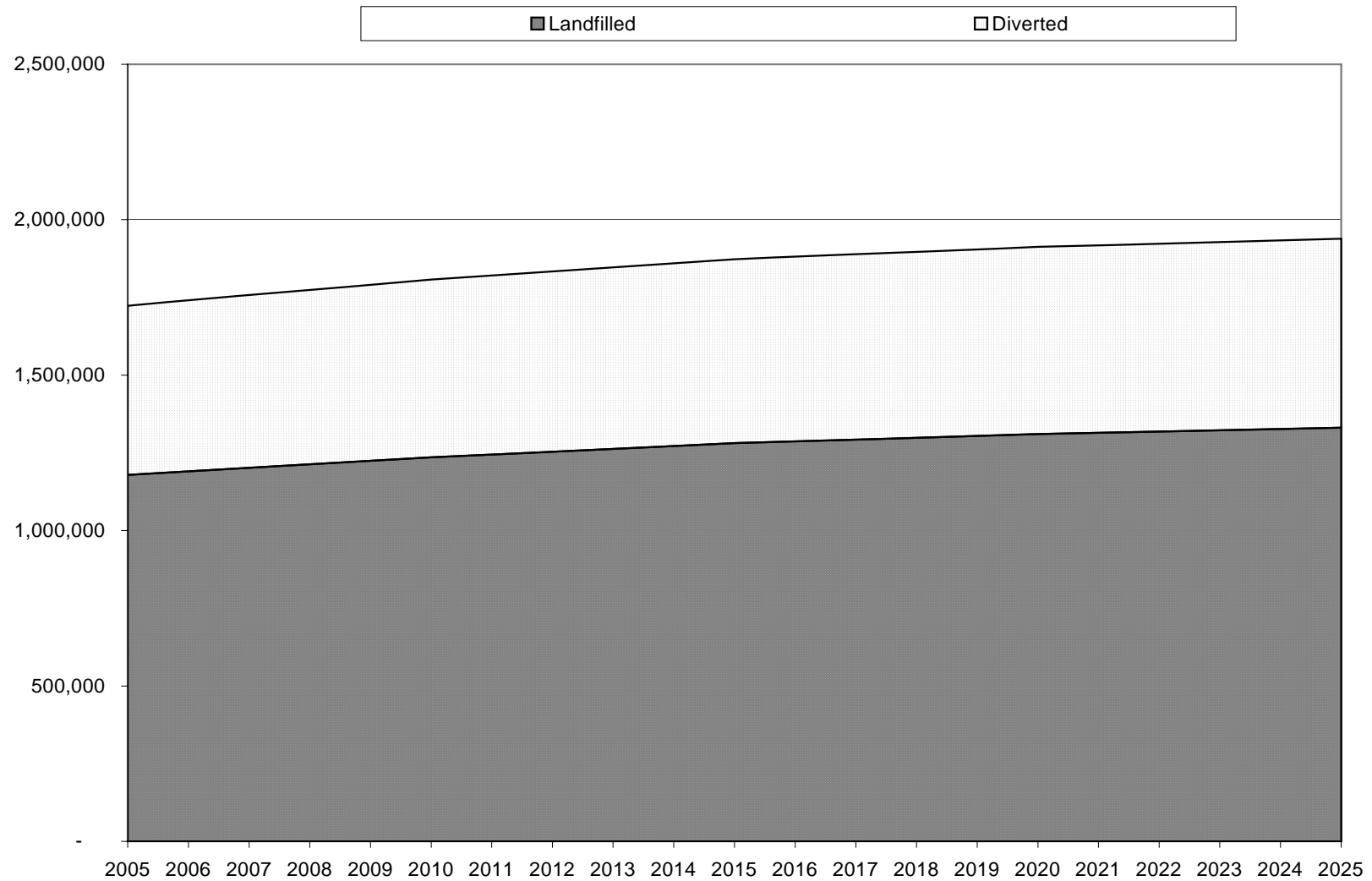
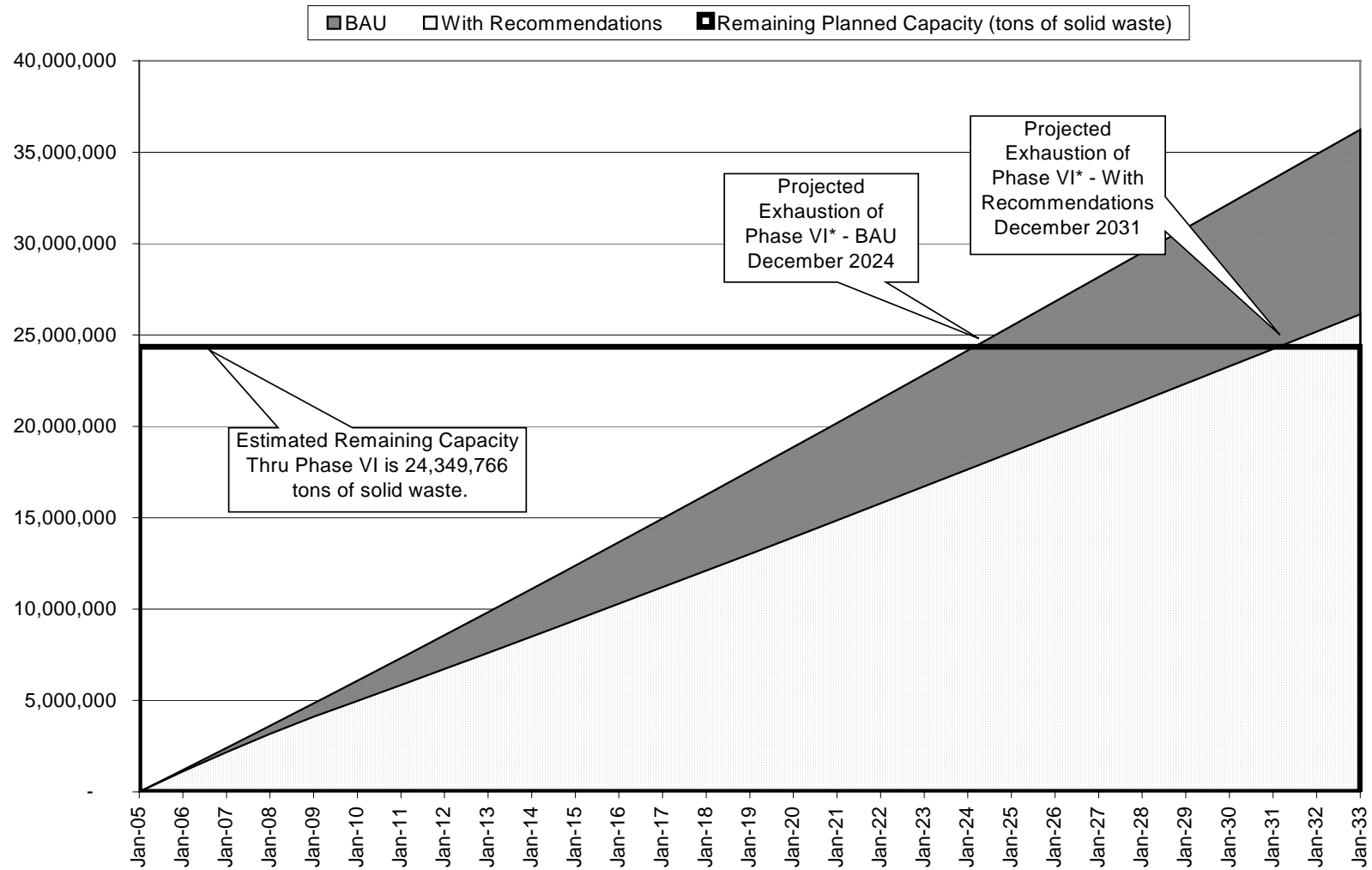


Figure 171-5-9 Projected Cumulative Solid Waste Disposed and Landfill Capacity Remaining



*Phase VI footprint including vertical expansion.

171-6 STATUS OF THE ~~MANDATED~~ SOLID WASTE MANAGEMENT SYSTEM

6-1 INTRODUCTION

The state has developed an integrated system of solid waste management facilities and programs based on priorities of 1) reduction in waste generation, 2) source separation and recycling, 3) waste processing to reduce the volume of waste necessary for land disposal, and 4) land disposal. Additional considerations are the requirements of the legislature, DEM, the courts, and economic conditions. This part of the Plan describes this mandated system that includes:

- RIRRC's Waste Prevention Programs;
- The statewide Municipal, Commercial, State Agency, Multi-family, and Schools Recycling Programs; Recycling Market Development Programs; multiple Composting Programs; and RIRRC's Materials Recovery Facility (MRF);
- RIRRC's Central Landfill facilities in Johnston;
- RIRRC's facility and program for the disposal of Household Hazardous Waste and
- DEM'S non-regulatory recycling responsibilities under Chapters 23-18.8 and 23-18.9 of the Rhode Island General Laws.

A very significant change occurred in Rhode Island's state-level solid waste management system between 1996 and 2005 with the departure of the DEM from the field of non-regulatory solid waste management programming. With the inception of statutorily mandated state government agency recycling and waste reduction activities in 1987, the DEM played a prominent role in many non-regulatory solid waste management programs and a leading role in fields such as the management of hard-to-dispose-of wastes, including batteries and tires; household hazardous waste management; commercial recycling; and waste prevention. The DEM and the RIRRC were partners in program areas such as municipal recycling, waste prevention, and leaf and yard waste composting, and in sponsoring research in many areas of solid waste management.

By law, RIRRC provided the funding necessary to support DEM's recycling staff during the first three years of the design, start-up, and implementation of the statewide municipal source-separation and recycling program. When RIRRC funding ended, and as DEM's other sources of outside funding for recycling activities dried up, the agency ~~did not replace those funds in order was unable~~ to continue its active participation in non-regulatory recycling activities. By 1999, the DEM had left the field of non-regulatory recycling activities entirely, its solid waste management activities were confined to regulatory enforcement and compliance; RIRRC became the only entity of state government involved with non-regulatory solid waste management programming. This is the institutional arrangement that existed at the state level at the time this Plan was adopted and published. ~~Despite this practical reality, t~~The statutes authorizing and empowering the DEM to conduct certain

recycling activities and DEM's regulations guiding the agency's activities in non-regulatory recycling activities remain in place.

6-2 WASTE PREVENTION AND REUSE

6-2-1 Background

Waste prevention refers to efforts to eliminate or reduce the amount or toxicity of materials that will become waste, before they enter the solid waste stream and is therefore the most environmentally preferable and, potentially, the least costly alternative to recycling and disposal. The concept is simple -- not creating waste in the first place. Waste prevention may occur at any stage in the life of a product, from raw material extraction through design, manufacture, transportation, purchase, use and, finally, disposal.

Waste prevention will require sustained, long-term effort. The roots of the steady trend of increasing waste production that has been observed over the past 10 years are embedded in our economy and culture. Changing the trend will require extensive education to teach consumers and producers less wasteful behavior. Significant incentives, disincentives, and regulations may also be necessary to ensure that waste prevention strategies are adopted. Waste prevention activities include education, training, public outreach, and marketing or informational activities, and traditionally they have focused primarily on the consumer. Since consumer behavior is driven by the products available for purchase, addressing consumer behavior should represent only one step in a comprehensive waste prevention program. It would be difficult to achieve and sustain waste preventing behaviors through consumer education alone, while ignoring the roles of manufacturers and retailers.

Large manufacturers have the resources and influence to effectuate waste reduction or prevention by dictating product specifications and packaging requirements. However, retailers are the logical location for take-back programs for electronics, batteries, and other hard-to-dispose of wastes. Retailers also can participate actively in packaging-reduction programs.

The benefits of waste prevention are typically not accounted for because they are difficult to quantify and because waste prevention is not applied to an existing waste stream. Waste prevention programs have never received significant funding compared to other waste management programs because, unlike recycling, waste prevention efforts will not extend the capacity of waste-disposal facilities in the short term. In addition, other benefits, such as removing toxics from the waste stream, are difficult to quantify. Because waste prevention programs do not generally generate revenues, funding for waste prevention is often dependent on funding mechanisms, such as a percentage of tipping fees, a tax on particular products or the institution of user fees for waste management, with funding set aside for waste prevention programs. User fees have the added benefit of making citizens more aware of their consumption and disposal habits.

Fifteen years ago, RIRRC and the DEM jointly established the Source Reduction Task Force funded by RIRRC and consisting of public and private sector leaders. The Task Force sponsored a wide range of waste prevention programs and activities including teaching

curricula, and other educational, public information and outreach materials and research projects. The Task Force has been inactive for a number of years. From 1998 through 2002, funding was not provided for waste prevention programs.

A selection of waste prevention and/or toxicity reduction statutes includes the following:

- **Ch. 23-18.10, Prohibition of Products Containing Chlorofluorocarbon Products**

Products containing CFC-11 and CFC-12 are prohibited except under specific, tightly regulated circumstances.

DEM is responsible for enforcement.

- **Ch. 23-18.13, Toxic Package Reduction Act;**

Rhode Island manufacturers and distributors are prohibited from selling or issuing packaging that contains more than 100 parts per million of lead, mercury, cadmium, or hexavalent chromium.

DEM is responsible for enforcement.

- **Ch. 23-24.5, Asbestos Abatement**

The use and disposal of asbestos and asbestos content products is regulated.

Department of Health is responsible for enforcement regarding removal activities.

- **Ch. 23-24.9, Mercury Reduction and Education Act**

The sale and use of products containing mercury is regulated

DEM is responsible for enforcement

Over time, the nation and the state have become increasingly sensitized to the various economic and environmental benefits that can be derived from waste prevention activities and various innovative waste prevention programs have emerged. An increasingly popular genre of waste prevention activities are reuse programs, including exchange programs, that divert materials from the waste stream to make them available to those who will continue to use them.

Another increasingly widespread and effective waste prevention activity is the practice of purchasing products or services that minimize waste, conserve energy and other resources, reduce toxicity and/or contain recycled content, a practice that is often referred to as Environmentally Preferable Purchasing (EPP). A number of states are buying environmentally preferable products based on a variety of criteria including durability, toxicity, recycled content, recyclability, energy efficiency, and reduced packaging. Massachusetts and Connecticut both have implemented aggressive EPP programs that could serve as models for Rhode Island to initiate its own EPP program.

6-2-2 Current Status of Waste Prevention and Reuse

In 2004, RIRRC significantly increased its commitment to re-establish an active and vigorous waste prevention program by hiring a full-time Waste Prevention Coordinator who,

according to the job description of the new position, “will be responsible for the design, development, implementation and promotion of policies and programs to promote waste prevention among residential, institutional and commercial waste generators.” The Coordinator will also design and implement a variety of waste prevention education and outreach programs including seminars, public presentations, technical assistance, and targeted publications.

The Coordinator immediately assumed responsibility for RIRRC’s internet-based materials exchange programs, the agency’s most significant and effective waste prevention activities. Within months, RIRRC created an internet-based, residentially oriented equipment and materials exchange program called “FreeMarketRI”, with an internet address of FreeMarketRI.org, where homeowners can list the availability of items they want to give away, or search for free items that they need. Children’s things, household items, tools, appliances, furniture, lawn and garden items, marine equipment, musical instruments, pet equipment, and recreation and exercise equipment can be listed on the FreeMarketRI.org website. In March 2005, after its first full year of operation, nearly 16,000 Rhode Islanders had registered or used FreeMarketRI and approximately 68,000 pounds of material were diverted from the landfill.

RIRRC also operates a commercial/industrial/institutional internet-based program for the free exchange of surplus material and equipment called “ResourceXchange” that serves southern New England from a website of the same name. Businesses, government agencies, educational institutions, and private non-profit organizations can use the ResourceXchange website to list the availability of a wide variety of surplus material or equipment that they want to give away. Alternatively, they can use the website to search for free material or equipment that they need. This program, whose web address is www.ResourceXchange.org, was re-designed and re-invigorated in 2004 to develop into an increasingly successful vehicle for the diversion of material from the landfill.

Another example of an innovative exchange program is Recycling for Rhode Island Education (RRIE), a private non-profit organization that obtains from the business community clean, non-toxic, reusable excess materials and equipment that would otherwise be landfilled for distribution to educators and community organizations. RIRRC has supported RRIE with annual grants ranging from \$8,000 to \$50,000. The financial support provided by RIRRC has been critical to the ongoing operation of RRIE.

One of the principal elements of waste prevention -- the reduction of toxics in the waste stream -- is best addressed from a regional or national perspective. An example of a successful regional program is the Toxics in Packaging Clearinghouse (TPCH), which was formed in 1992 to promote the adoption by states of model legislation to reduce the amount of heavy metals in packaging; the DEM has participated in this effort on behalf of the state. Rhode Island is one of 19 states that have enacted the model legislation. In 2004, NERC, whose board president in 2004-2005 was John Trevor, RIRRC’S Recycling Manager, assumed management responsibility for the TPCH. Its mission has been broadened to include development of public policy actions for the reduction of toxicity in packaging.

One of the most successful waste prevention efforts has been the promotion of home

backyard composting. This issue is addressed in section 6-3-7.

6-2-3 Findings

Although waste prevention is a crucial component of any comprehensive resource and waste management system, it cannot be sustained without adequate funding. Waste prevention programs at the DEM have not been funded by the state since 1996; RIRRC resumed its funding of waste prevention programs in 2003.

In Rhode Island, citizens find little economic incentive to reduce the amount of solid waste they generate. Rather, the costs of municipal solid waste management are, in most cases, paid for from property tax revenues and are seemingly invisible to the homeowner. Furthermore, municipalities do not have a significant economic incentive to undertake waste prevention activities because of the low municipal solid waste tipping fee that has statutorily set at \$32.00/ton since FY 1992.

While waste prevention programs are challenging, the payoff of successful waste prevention can be immediate, long-term in nature, and of exceptional economic and environmental value because it produces disposal capacity, the most economically valuable of solid waste management commodities.

Although setting a waste prevention goal and measuring the success of the state's waste prevention program will be difficult, it is necessary to stimulate action and inspire continued progress toward actually reducing solid waste.

While Environmentally Preferable Purchasing can be an effective method of reducing the amount of waste created and reducing the toxicity of the waste stream, Rhode Island does not have in place a set of standards or procedures in place to guide the purchasing of environmentally preferable products with the exception of the five statutes referenced above.

An Environmentally Preferable Purchasing Program had been tried but failed primarily due to the State's inability to hire a program coordinator who would be responsible for rewriting specifications and ensuring that agencies follow through.

From 2001 to 2003, the Massachusetts Department of Environmental Protection sponsored a project to assess the potential of using Resource Management contracting to prevent waste and increase recyclables diversion while reducing the costs of trash hauling and disposal. Under the traditional types of contracts used by haulers in Rhode Island to pick up trash from their customers, there are no incentives for the haulers to encourage reduction or diversion. In fact, exactly the opposite is the case: the more waste that is generated, the more money the hauler makes. Resource management contracting provides incentives to generators, who benefit by paying less for disposal and to haulers because increased profits are tied the value of their services that foster prevention, reuse, and recycling. The waste management cost savings potential identified for each of the nine companies or institutions that participated in the project ranged from 13 to nearly 50 percent.

6-2-4 Actions

A stable, long term funding system should be developed to maintain the additional staff and

resources necessary to carry out effective and efficient waste prevention programs. Although the precepts of waste prevention are relatively simple to communicate and implement, substantial funding will be required to re-establish the type of broad program that was conducted in Rhode Island a decade ago in order to bring about long-term reductions in Rhode Island's waste stream and to help conserve Central Landfill by extending its life. It is important to note that many of the following actions have been tried but failed due to a lack of resources. Critically important is to have a full-time coordinator in the lead agency who will be responsible for program implementation

The following actions outline the minimum requirements for a continuous and effective waste prevention program in Rhode Island.

1. Establish a Waste Prevention Task Force

In the late 1980s and early 1990s, the Source Reduction Task Force provided a forum where representatives of diverse viewpoints and interests could consider waste prevention policy and programs in an atmosphere of cooperation. RIRRC will by September 30, 2007, convene a new Waste Prevention Task Force, whose work will be staffed by the Waste Prevention Coordinator. The Waste Prevention Task Force will provide expertise and guidance to efforts to develop waste prevention legislation and implement innovative waste prevention programs. Funding needed for the operation of the Task Force will be provided by RIRRC. The Task Force will be appointed by RIRRC and will include representatives from local business and industry, environmental organizations, educational institutions, appropriate state agencies, local government, the legislature, and the general public.

2. Set Waste Prevention Goals

RIRRC, guided by the Waste Prevention Task Force, will conduct sufficient research concerning programs implemented by other states to determine the practicability and economic feasibility of establishing waste prevention goals for the state. This determination shall be made by January 1, 2008.

3. Establish a State Waste Prevention Program

Effective for the commencement of Fiscal Year 2008, the RIRRC will develop and implement a Waste Prevention Program.

4. Initiate an aggressive Environmentally Preferable Purchasing Program (EPP), as follows:

The State should, through its purchasing policy and practice, affirmatively promote the use of environmentally preferable products. The Department of Administration, after consulting with the DEM and RIRRC, should develop an aggressive EPP effective July 1, 2008. This will require the hiring of an EPP Program Coordinator, perhaps on a two-year trial basis. Experience in Massachusetts indicates that EPP coordinators have saved that state enough money to pay for their salaries. RIRRC and the DEM The Coordinator shall would advise Division of Purchases concerning the technical specifications for the environmentally preferable products, materials,

and supplies to be purchased by the State. ~~which~~The specifications should be reviewed annually to ensure they are up-to-date. EPA's EPP standards should be considered for inclusion in the State's master purchasing agreements. The Department of Administration, after consultation with the DEM should, through regulations, establish a time-table requiring increased utilization by the State of environmentally preferable products. In January of each year, the Department of Administration should report to the General Assembly the State's progress in purchasing environmentally preferable products materials and supplies for the preceding twelve months.

5. Establish/Expand Reuse Programs

The Waste Prevention Task Force and RIRRC should continue the development and funding of existing exchange programs and seek to expand opportunities for reuse in Rhode Island including the establishment of additional reuse centers.

The RIRRC should consider establishing a technical assistance program effective January 1, 2008, to encourage local business and industry to explore the possibility of using waste materials as feedstock for existing or new manufacturing programs. Technical assistance in developing business plans; evaluating technologies; material testing; and marketing could promote reuse of materials currently managed as waste, as well as economic development and jobs creation. The King County, Washington LinkUp program is a model that should be evaluated.

6. Mandate Paper Waste Prevention Programs

During 2006, the DEM, the State Division of Purchasing, and the State Division of Information Technology, shall jointly design a model comprehensive, multi-faceted Paper Waste Prevention Program that would be implemented in all State offices. The Department of Administration would be the lead implementation agency, RIRRC would provide technical support, and the DEM would monitor compliance and provide enforcement. Implementation of the program on an agency-by-agency schedule would begin July 1, 2008. It is also recommended that RIRRC and DEM, beginning October 1, 2008, work with municipalities to encourage each municipal office to put the model Paper Waste Prevention Program in place.

7. Review Existing Waste Prevention-related Statutes and Regulations.

DEM should review the statutes referenced in §6-2-1 above and the regulations adopted to implement the statutes to determine whether the statutes and regulations are enforced and/or enforceable and, if necessary, by no later than June 30, 2007, seek either to enhance implementation of the statutory language or seek to amend the statutes and regulations to better match the agency's regulatory and non-regulatory approach to solid waste management.

8. Develop and implement model reduction projects for institutional and commercial waste streams.

By June 30, 2007, RIRRC should develop a model waste reduction program for state

agencies. The DEM and RIRRC should jointly undertake to work with state agencies to begin implementation of the program in specific agencies by January 1, 2008. The DEM should mandate State agency participation through its existing regulatory authority. Other institutions and businesses can then learn from the successes of these model projects and apply the appropriate strategies to their own waste streams. Such projects will also provide the state with specific data on the potential for various waste prevention measures to succeed. Model projects will also provide a means of tracking and measuring reductions in non-residential waste streams.

9. Increase Education, Outreach, and Technical Assistance

- a) Since the value and importance of waste prevention remains relatively unknown to the public at large, educational outreach is essential. Stand-alone informational campaigns, however, are rarely sufficient to actually change and sustain behavior over time. For educational outreach to be successful, it must be coupled with strategies and “hands-on” programs designed to reinforce behavioral change. Therefore, education, outreach, and technical assistance programs should be coordinated to ensure that key topics for waste prevention are identified to include but not be limited to retail packaging and household toxics, with particular attention to mercury, lead, and electronics. The Waste Prevention Task Force and appropriate staff from RIRRC and the DEM will work together to fund, design, implement, and evaluate outreach and technical assistance programs and to publicize the waste prevention impacts of these efforts. Program implementation should begin January 1, 2008.
- b) Environmental partnerships should be formed between RIRRC, the DEM, community groups, businesses, Chambers of Commerce, environmental organizations, etc. These partnerships will enable the RIRRC and the DEM to reach out to their target audiences more effectively using the environmental organizations’ member and volunteer base. Outside organizations are immune to State budget fluctuations and may be able to provide more stability for these educational efforts. RIRRC and the DEM should begin to work on the development of these partnerships immediately upon adoption of the Plan by the SPC.
- c) As soon as feasible after adoption of the Plan by the SPC, RIRRC, and the DEM will invite the Department of Education to work with them to identify opportunities to promote waste prevention in the classroom. Staff will evaluate existing, Rhode Island-specific curriculum materials. These materials may be updated and promoted, as appropriate. Alternatively, new waste prevention modules for use in elementary and secondary schools should be developed in cooperation with the Department of Education to ensure their successful introduction into the curriculum.
- d) DEM should pursue waste prevention-oriented supplemental environmental projects involving solid waste and hazardous violators.

- e) RIRRC and the DEM should, on an on-going basis, ensure that Rhode Island is an active participant in regional and national waste prevention education programs such as the recent thermometer exchanges to reduce mercury in the environment.
- 10. The Waste Prevention Task Force, in cooperation with DEM, shall review resource management contracting literature, including the reports issued by the Massachusetts DEP, by January 1, 2008. Based on this research, the Task Force and the DEM shall cooperate in establishing a program to promote resource management contracting by March 31, 2008.
- 11. The Waste Prevention Task Force and the DEM shall work with a stakeholders group to develop a recognition program for companies that undertake and achieve exemplary efforts in waste prevention. This program shall be in place September 30, 2008.

The implementation of the concept outlined above will require a renewed and sustained effort along with adequate financial support.

6-3 PAY AS YOU THROW

6-3-1 Background

User fee systems increasingly have become a widely used management strategy nationwide for reducing waste generation and maximizing recycling. Also known as variable-rate pricing, bag-tag, or pay-by-the-bag, user fee systems will be referred to in this Plan as Pay-As-You-Throw (PAYT) systems. In PAYT systems, householders pay directly for their solid waste services that would otherwise be paid for by local taxes. Because households pay only for management of the amount of trash they generate, they have an incentive to minimize trash and maximize recyclables. On the other hand, tax-supported systems provide no incentive to reduce waste and maximize diversion because trash disposal costs covered by taxes are invisible to homeowners.

EPA estimates that PAYT systems are in place in more than 4,000 municipalities nationwide. PAYT systems are particularly successful in communities with high solid waste tipping fees. In Massachusetts and Connecticut, for example, where tipping fees average \$65.00 to \$70.00 per ton, hundreds of municipalities have adopted PAYT systems which have succeeded in diverting from 15 to 25 percent more waste from disposal than tax-supported management systems.

Common concerns regarding PAYT include the potential incentive for increased illegal dumping and the potential hardship for residents with low or fixed incomes. Some communities that have implemented PAYT have reported that increased illegal dumping either was a temporary problem or was not a problem at all. All communities reported that they experienced illegal dumping before they adopted PAYT and that they still had illegal dumping afterwards.

PAYT systems can be structured to provide assistance to avoid hardship for residents with low or fixed incomes. Municipalities can reduce the charges by a set amount or by a percentage discount or offer a certain number of free bags or stickers to low-income residents. Assistance can also be offered through existing low-income programs.

6-3-2 Current Status of PAYT

In an effort to increase the diversion of recyclable materials from the municipal waste stream, RIRRC has aggressively advocated for the adoption of PAYT programs by municipalities; the Corporation has provided data and technical assistance to a number of municipalities that have expressed interest in PAYT systems. At the request of a number of municipalities, RIRRC staff have made presentations or conducted workshops for local officials.

In FY 2005, RIRRC made available in its budget nearly \$500,000 to municipalities to help defray PAYT program start-up costs, including the purchase of special trash bags. The funding was intended to serve as an incentive to stimulate municipalities to implement PAYT programs. No municipalities did so and none applied for the funding. As of 2005, no Rhode Island municipality had adopted a full-fledged curbside PAYT system.

Seven Rhode Island municipalities have implemented modified PAYT programs, all of which are weight-based drop-off programs at local transfer stations: Westerly/Hopkinton (jointly), South Kingstown/Narragansett (jointly), New Shoreham, North Kingstown, and Richmond.

6-3-3 Findings

PAYT programs help reduce the amount of solid waste that is disposed of and reduce the municipalities' solid waste management costs while shifting the burden to residents. The solid waste management systems in place in Rhode Island offer few incentives to encourage municipalities to adopt PAYT. The relatively low municipal tipping fee provides little incentive for the adoption of PAYT and taxpayers resist because they do not want to pay directly for trash disposal unless their tax bills are reduced when their taxes are no longer paying for solid waste services. In fact, a number of municipal officials reported that preliminary plans to adopt PAYT programs in their communities were aborted because of intense opposition by taxpayers to being required to assume the burden of a new payment -- in the form of paying directly for trash and recyclables collections under PAYT -- unless their property taxes were reduced proportionately.

Community officials and residents have indicated that they would be more likely to support PAYT if at least one successful curbside PAYT program existed in Rhode Island. Extensive citizen education, highlighting its costs and benefits would be critical to successful implementation of PAYT.

Many officials believe that PAYT programs will not be undertaken by Rhode Island municipalities unless they are mandated to do so by law.

However, because PAYT systems improve the recyclables extraction of traditional recycling programs by 15 to 25 percent, they would be an ideal program to achieve the higher levels of recycling that are called for in the Municipal Recycling section of this Plan.

6-3-4 Actions

1. RIRRC will continue its program of offering technical assistance and financial incentives to municipalities to encourage them to adopt PAYT programs. However,

additional incentives may be required to successfully initiate this program given the lack of success of previous efforts.

2. DEM and RIRRC will continue to advocate and promote the development of PAYT programs by municipalities by urging the establishment of higher municipal tipping fees and through aggressive educational and public outreach programs.
3. By October 1, 2007, RIRRC and the DEM shall develop model legislation that would require municipalities to implement PAYT. The DEM may submit said legislation in the 2008 session.

6-4 RECYCLING

Recycling is the state's second highest priority for solid waste management. The authority for the mandatory recycling program was established in the 1986 amendments to RIGL §23-18.8, §23-18.9, and §23-19 requiring municipalities, businesses, and state agencies to recycle. This section describes all major recycling programs that are being managed by RIRRC and DEM.

A number of specialized recycling statutes have been enacted, including the following:

- **Ch. 23-18.11, Promotion of Paper Bag Usage**

Paper bag usage is encouraged by requiring all retailers to make paper as well as plastic bags available. Furthermore, supermarkets are required to provide receptacles for plastic bags returned by customers for recycling.

RIRRC may promulgate enforcement regulations.

- **Ch. 23-18.12, Beverage Container Recyclability**

Requires distributors to sell beverages only in the type of containers that had attained a 50 percent recycling rate by 1992.

DEM is responsible for enforcement.

- **Ch. 23-18.15, Plastic Bottle and Container Labeling Act**

Plastic bottles or containers must have a prescribed identity code for the container's resin marked on the container in a triangle of arrows.

DEM is responsible for enforcement.

- **Ch. 23-28.16, Newspaper Recyclability**

All newspapers, magazines, and journals are required to buy a minimum of 40% post-consumer material for producing their products.

DEM is responsible for enforcement.

- **Ch 23-19.6, Used Oil Recycling**

It is the policy of the state to encourage the collection and recycling of used oil.

DEM is responsible for enforcement.

▪ **Chs. 23-60 and 23-60.1 Battery Deposit and Control and Dry Cell Battery Control**

The disposal of automotive batteries is regulated and their recycling is encouraged; the content and use of dry cell batteries is regulated.

DEM is responsible for enforcement.

Recycling incorporates four distinct activities: collecting materials, processing them for market, marketing the materials to an end user, and manufacture of the materials into new products. Only in the last decade has recycling been considered a significant option for waste management. The present focus of the recycling industry is on improving the economics of collection, separating, processing, and manufacturing new products from post-consumer materials; on expanding the amount and type of materials that can be recycled; and on strengthening markets.

6-4-1 Municipal Recycling

6-4-1-1 Background

The framework for the Rhode Island municipal recycling program is established in RIGL §23-18.8, §23-18.9, and §23-19, and further specified by RIRRC policies and the DEM Municipal Recycling Regulations. The DEM regulations define the materials to be recycled and provide broad guidelines within which municipal recycling is implemented.

The materials included in the municipal recycling program are defined in the DEM Municipal Recycling Regulations. The regulations define municipal recyclables as:

- glass food and beverage containers
- tin-coated steel cans/steel cans, empty paint cans
- aluminum cans, foil, and pie plates
- newspaper, brown kraft paper, old corrugated cardboard, office papers (stationery, computer paper, copy paper), chipboard, magazines, catalogs, mail, phone books
- white goods
- aerosol cans
- scrap metal
- milk, juice, and aseptic drink cartons
- HDPE plastic bottles and jugs; PETE plastic containers
- textiles, including, towels, linens, clothing, cloth scrap, stockings, rags, belts, handbags, shoes, excluding women's heels
- leaf and yard waste

RIGL §23-18.8-2(11) directs the DEM to redefine the mandated materials and to change them “...from time to time depending upon new technologies, economic conditions, waste stream characteristics, environmental effects, or other factors.” In practice, factors taken into account when determining which materials are defined as recyclable include the amount of materials in the waste stream, the cost of collecting the material, the availability of facilities to prepare the materials for market, the availability of markets, and the adverse environmental or health impacts that may result from disposing of a particular material in some manner besides recycling.

Estimates of the total amount of recyclable materials in the waste stream are available from the 1990 waste composition analysis. According to the study, materials currently defined in the DEM regulations as “recyclable” constitute about 61 percent of the municipal waste stream.

Residential recycling in Rhode Island has evolved as an accepted and routine daily household activity for a majority of residents. At the inception of municipal recycling in 1989, both the DEM and RIRRC were involved in the planning and implementation of municipal recycling programs. After the initial period of program development and start-up, DEM’s municipal recycling technical and compliance assistance efforts were phased out. Since 1999, only RIRRC has been involved in municipal recycling planning and implementation initiatives. RIRRC’s initiatives have sought to increase the volume of materials recovered by municipal recycling programs through education and increasing the number of towns implementing the Maximum Recycling Program. The DEM is no longer active in non-regulatory solid waste management programming. Responsibility for Municipal Recycling Regulations at the DEM was formerly under the auspices of Office of Environmental Coordination (now Strategic Planning and Policy) but is now under the purview of the Office of Waste Management.

From 1996, when the initial Plan was adopted, until 2002, RIRRC focused its efforts on expanding municipal recycling from the original “Blue Bin” program, which targeted about 25 percent of the municipal waste stream, to the Maximum Recycling Program, which targets approximately 40 percent of the municipal waste stream. The scope of the original program was broadened by adding corrugated cardboard, mail, catalogs, magazines, office papers, paperboard containers, waxed paper milk and juice cartons, aseptic packages, all PETE plastic bottles, and all colored HDPE plastic bottles, empty aerosol and paint cans, and old clothing and textiles.

As part of the implementation of Maximum Recycling, RIRRC provided a second, green, recycling bin to the municipalities for free distribution to all residents. This allowed residents to accommodate the additional paper materials accepted in the Maximum Recycling Program. Municipalities were phased into the Maximum Recycling Program beginning in 1995, with RIRRC providing technical and financial assistance as well as education and training programs. By July 2002, the 36th and last, participating municipality implemented the Maximum Recycling Program.

Three municipalities were not included in Maximum Recycling implementation. The towns of South Kingstown and Narragansett have never formally participated in the program but residents in both municipalities have access to recycling at South Kingstown’s Rose Hill

transfer station. The two communities are currently studying ways to increase their recycling rates. New Shoreham provides access to recycling at its transfer station, and has historically marketed some of its own material because of its unique geography and costs to deliver material to RIRRC. However, in 1994 New Shoreham resumed delivery of material to RIRRC.

For a number of years, RIRRC provided financial incentives to municipalities, totaling \$300,000 annually, which were allocated according to the amount of material diverted to the MRF from disposal by each municipality. The purpose of these annual Municipal Participation Grants was to reward and encourage continued participation in the recycling program and to provide funding for recycling program-related initiatives undertaken by the municipalities.

Following the completed rollout of the Maximum Recycling Program, RIRRC began evaluating the effectiveness of the program in diverting an increasing amount of recyclables from the municipal waste streams. After increasing annually during the phased implementation of the Maximum Recycling Program, the overall statewide municipal sector recyclables diversion rate, including leaf and yard debris composting, has leveled off at an average of the municipal waste stream of approximately 22 percent during 2004 and 2005. Municipal diversion rates vary widely between municipalities from between 8 percent to upwards of 30 percent.⁶

6-4-1-2 Current Management Practices

a. Municipal Solid Waste Tonnage Cap (Municipal Cap)

The municipal solid waste tipping fee is established by law, which also establishes the Municipal Cap as the mechanism to determine the amount of a municipality's MSW that is eligible to be disposed of for the statutorily established municipal tipping fee. Under the law, RIRRC establishes a tonnage cap for each municipality. All MSW up to the tonnage cap delivered by a municipality to the Landfill for disposal is charged the municipal tipping fee and all MSW over its Cap is charged the commercial tipping fee, which historically has always been significantly higher than the municipal tipping fee. RIRRC calculates the Municipal Caps based on an assumed per-capita waste generation and incorporates the target waste diversion rate for the municipalities. As the targeted diversion rate is increased, the Municipal Caps are decreased by the corresponding and appropriate percentage. This mechanism, therefore, gives municipalities the incentive to increase their level of waste diversion in order to avoid paying the significantly higher commercial tipping fee for any waste over their Cap. Currently, the cap calculation is based on an assumed residential waste generation rate of 0.487 ton per resident per year, the 2000 Decennial Census population, and a target waste diversion rate of 20 percent. Reducing the Municipal Cap is one mechanism available to RIRRC to provide an incentive to municipalities to achieve increased recycling

⁶ Municipal recycling rates can be calculated with relative accuracy because RIRRC maintains fairly comprehensive data on recyclables delivered by the municipalities to the MRF. However, data on leaf & yard debris processed by the municipalities is not comprehensive so calculating diversions rates for municipalities that process their own leaf & yard debris is dependent on the municipalities providing this data to RIRRC (see Table 171-5-1).

rates.

b. Municipal Contracts

The solid waste disposal and recycling contracts that RIRRC has offered to municipalities since 1992 have evolved into instruments to provide municipalities with incentives to increase recycling and the most significant such incentive is the Municipal Cap. The contracts also provide financial bonuses to those municipalities that divert from disposal enough recyclables to equal at least 20 percent of their MSW stream delivered to RIRRC for disposal or MRF recycling. For Fiscal Year 2006, municipalities with contracts who achieve or exceed the 20 percent MRF Recycling Rate will receive a pro-rata share of a pool of \$300,000. Furthermore, the FY 2006 contract also provides a total of another \$25,000 from which RIRRC will make a grant to up to three municipalities that RIRRC determines to have achieved the greatest increase in recyclables diversion but who did not achieve the statewide 20 percent target MRF Recycling Rate. Additional incentives in the FY 2006 municipal contracts include free disposal of leaf and yard debris, white goods disposal discounted from \$65.75/ton to \$17.00/ton, and waste tire disposal discounted from \$65.75/ton to \$25.00/ton.

c. Recycling-related Education & Outreach Program Initiatives

Since 1996, and particularly since 2002 when the Maximum Recycling Program was fully implemented, RIRRC significantly increased its emphasis on public education and outreach. Since publication of the first Plan, RIRRC has spent several million dollars on a wide range of advertising and public relations campaigns promoting various aspects of 1) recycling, reuse, composting, and household hazardous waste disposal; 2) development and distribution of a wide variety of new audio and visual informational materials; and 3) awarded tens of thousands of dollars in research grants.

In 2004, RIRRC: 1) undertook the redesign of the MRF Education Center to include eight new exhibits and the refurbishment of all the rest of the exhibits at a cost of more than \$40,000; 2) used its speakers bureau to conduct about 500 lectures at schools and other organizations, reaching nearly 50,000 persons; and 3) distributed Elementary Education Recycling Kits to more than 40,000 students. In 2005, the Corporation completed development of a new waste prevention and recycling curriculum guide for use in grades five through eight; these were distributed to middle schools statewide with the potential of reaching approximately 58,000 students or more than one-third of Rhode Island's public school enrollment.

Among the most popular and successful of RIRRC's education and outreach activities are the presentations at schools concerning recycling and its program of MRF tours conducted for school children. Since 1996, more than 1,500 school presentations and MRF tours have been conducted reaching more than 150,000 students.

d. Municipal Recycling Costs

As the costs of operating the mandated source separation and recycling program have increased to the point of creating budget difficulties for some cities and towns, the RIRRC has begun working with municipalities to help them lower the collection costs associated with the recycling program.

For example, RIRRC provided Warwick with two grants of \$160,000 to purchase 8,000 65-gallon, wheeled recycling carts for the implementation of the city's automated solid waste and recycling program. In 2005, Warwick completed the phased implementation of this program under which the city purchases three carts for each household for the alternating bi-weekly collection of paper and mixed recyclables and the weekly collection of trash. The carts are collected using trucks equipped with automated arms that pick up the containers and tip them into the trucks. Warwick has significantly reduced its collection costs because: 1) the trucks require only one operator; 2) worker productivity has been quadrupled; 3) Workers' Compensation and overtime payments have been virtually eliminated; and 4) the extraction rate of recyclables has been increased to nearly 40 percent, thereby very substantially reducing the city's trash landfill disposal costs. Warwick's recyclables extraction rate is approaching the levels achieved in the most successful PAYT programs in Massachusetts and Connecticut.

The RIRRC's plans in 2006 call for increased attention in two areas: 1) Assistance to municipalities to help reduce the costs of operating their recycling programs; and 2) Continue to incentivize and promote programs to help municipalities increase the capture rate of their recycling programs.

e. Textiles

The quantity and quality of textile materials collected in the municipal curbside recycling program since they were added to the list of mandatory recyclables have not achieved initial expectations. Due to the limited quantity received, the MRF is unable to process textiles cost-effectively. However, numerous privately run collection programs for textiles are available statewide.

6-4-1-3 Findings

Based on approximately 15 years of experience with municipal recycling, the following findings can be drawn.

- The municipal tipping fee, which has been set by law for the past 24 years, provides no incentive to the implementation by municipalities of aggressive recycling or reduction programs. The General Assembly has held the municipal tipping fee stable at \$32/ton since FY 1992.
- Lowering the Municipal Caps to reflect increasing levels of waste diversion is an alternative to increasing the municipal tipping fee. This mechanism provides the statutorily-established municipal tipping fee for that amount of waste that cannot be practically diverted while increasing the incentive for municipalities to divert that portion of the waste stream for which diversion is feasible.
- The residential waste generation rate used as a basis for calculating the annual Municipal Caps has not been updated in several years. Similarly, the population figures used in the Municipal Cap calculations has only recently been updated to reflect the Decennial U.S. Census figures.
- Approximately 61 percent of the MSW stream is composed of materials, including leaf

and yard waste, currently defined as recyclable in Rhode Island by the Rules and Regulations for Reduction and Recycling of Municipal Solid Waste promulgated by DEM.

- While per-capita waste generation rates have increased both nationally and in Rhode Island over the past eight years, the residential recycling rate in Rhode Island has increased modestly despite a decrease in the recycling rate nationwide over the same period. Nevertheless, the overall statewide recycling rate of approximately 15 percent recorded by municipalities in the blue bin/green bin program can be improved. PAYT and automated collection programs have demonstrated that they can efficiently and cost-effectively increase recycling rates. Enactment and enforcement of municipal ordinances might also be an effective mechanism for increasing diversion and compliance with Municipal Cap targets.
- The residential solid waste stream is evolving in many aspects. Residents have increased their propensity toward purchasing single-serve, disposable items. Materials in the waste stream have changed with the changes in socio-demographics of the area. Consumption of prepared food has increased, which in many cases is packaged in non-recyclable packaging. In addition, the use, distribution, and consumption of packaging have increased. The use of glass food and beverage containers has decreased while the use of plastic food and beverage containers has increased.
- The Maximum Recycling Program diverted about 14 percent of the municipal waste stream in 2005. The materials targeted by the Maximum Recycling Program constitute about 40 percent of the municipal waste stream, leading to the conclusion that a substantial amount of municipal recyclables are still being landfilled.
- It is recognized that some companies that collect recyclables and solid waste have on occasion expedited their route collection operations and maximized their profits by mixing recyclables with trash rather than segregating them.
- Increasing the recycling of textiles has not been attained. Although textiles have been listed as a mandatory recyclable and have been included in the municipal recycling program, residents prefer the many readily accessible alternative textile collection options for recycling old clothes and other textiles.
- The increase in the costs of collecting recyclables in the mandatory curbside program has become an increasingly important issue to municipalities and is a growing concern to RIRRC and DEM.
- Further research is necessary to reduce collection costs of recyclables. It has become increasingly important – even urgent – to develop programs that will reduce the cost to municipalities of collecting recyclables.
- In February 2003, the Materials Recovery Facility stopped marketing glass. Several years of a steady and persistent decline in the market price of glass resulted in the MRF experiencing continued and ever-deepening economic losses processing glass. The economic losses associated with processing glass for market resulted in MRF

management's decision to use glass aggregate from the recycling program as cover material for the Landfill. Furthermore, over the years, extensive damage was caused to the MRF's conveyor belts, rollers, and machinery by the countless millions of pieces of broken glass that were carried through the system. The new bottles and cans processing system installed at the MRF in 2005 was designed to minimize this type of damage because the new system will sort glass off the conveyor first rather than last.

- The General Assembly's policy of diverting revenues from the RIRRC to the State's General Fund has had a generally debilitating impact on the level of RIRRC'S solid waste management programming and research and development. From fiscal year 1995 through fiscal year 2005, \$43,000,000 has been diverted. These dollars could otherwise have been used by RIRRC to fund aggressive solid waste management programs designed to maximize waste prevention, waste diversion for recycling and re-use, and to extend landfill life by developing advanced techniques for the optimal use of landfill capacity.
- Because RIRRC is not a regulatory agency, it has not promulgated regulations for the enforcement of RIGL 23-18.11, The Promotion of Paper Bag Usage.

6-4-1-4 Actions

1. Because of the critical importance of extending the lifespan of the Landfill over the long term to provide continued solid waste disposal capacity for Rhode Island, the RIRRC will adopt a Municipal Cap Calculation that is consistent with the waste generation, population, and waste diversion assumptions of the Municipal Waste Projections contained in PART V of this Plan. The RIRRC shall establish and adopt a procedure for annually recalculating the cap (see Appendix B for a proposed procedure for updating the Municipal Caps). The target waste diversion rate used in the cap calculation procedure should ultimately be set, consistent with this Plan, to 35 percent. However, this increase in the target waste diversion rate should be phased in incrementally through 2010 so that the ultimate decrease in cap allocation from the current amounts occurs gradually, allowing municipal managers to adjust programs and budgets accordingly.
2. For the purpose of identifying the optimum recycling program that will minimize the cost to municipalities while at the same time maximize the diversion of recyclables from the waste stream, the RIRRC will sponsor a comprehensive study by an independent contractor of the advantages and disadvantages in terms of recycling program participation, recyclables diversion, and overall solid waste management economics of various collection systems and technologies. This study will also examine in detail the costs and benefits to municipalities and to the RIRRC of each of the systems studied. This study should begin no later than January 1, 2008. DEM will participate in the study for the purpose of identifying potential changes that could be made in existing DEM regulations to improve the efficiency and practicability of recycling programs.
3. RIRRC will review waste composition analyses recently completed by Pennsylvania,

California, and other jurisdictions. After conducting the aforementioned literature review, RIRRC will by December 31, 2008, complete an assessment of the necessity and/or appropriateness of commissioning an independent waste composition analysis of the Rhode Island municipal waste stream.

4. Upon adoption of this Plan by the SPC, RIRRC will seek to minimize the quantity of recyclable materials that are improperly disposed of at the landfill by stringent management of its disposal contracts with municipalities that require municipalities to bring all their recyclables to the MRF.
5. No later than January 1, 2008, the DEM shall develop a cost-effective program to enforce its Municipal Recycling Regulations established pursuant to the general laws to include, but not be limited to, a periodic review of the list of mandatory recyclable materials contained in the recycling regulations.
6. Effective for Fiscal Year 2008, RIRRC shall amend its municipal contracts to specify that the MRF will no longer accept or process textiles. The DEM and RIRRC shall advise all municipalities that textiles continue to be designated by the DEM regulation as a recyclable and that they must continue to be separated from solid waste and recycled utilizing private sector systems an alternative to the MRF.
7. RIRRC will undertake a study during FY 2007 to determine the optimal use for the crushed glass produced by the MRF alternative to its use as a landfill cover material. RIRRC should ensure that this research should thereafter be kept current with up-to-date data.
8. It is recommended that the General Assembly should not divert funds from the RIRRC to the State's General Fund because fund diversion weakens the RIRRC'S ability to mount the most aggressive and advanced waste prevention, recycling, and landfill utilization programs available.
9. RIRRC shall introduce legislation in the 2007 session of the General Assembly to amend RIGL 23-18.11 to provide that DEM, not RIRRC, will promulgate regulations to enforce this statute.

6-4-2 Commercial Recycling

6-4-2-1 Introduction

In Rhode Island, the term "Commercial Solid Waste" refers to all solid waste that is not Municipal Solid Waste, as defined in Part 1-7, of this Plan, Glossary of Terms. This means that most residential solid waste generated in apartment buildings, large multi-family houses, and condominium complexes that is collected and disposed of under a contract between the generator and the hauler and without municipal involvement is considered to be CSW.

CSW typically consists of a large percentage of recyclable materials, such as office paper and corrugated cardboard. An analysis to determine the composition of Rhode Island's CSW has never been conducted. The 1990 Solid Waste Composition Study analyzed 1) the

composition of the MSW stream only; and 2) the combined MSW and CSW streams, but not the CSW stream only. The EPA and most jurisdictions define MSW to be the combined residential and commercial waste streams and do their research in this combined waste stream context. Therefore, there are little data available concerning the composition of what in Rhode Island is defined as “Commercial Solid Waste.” However, the Statewide Waste Characterization Study conducted in 1999 by the California Integrated Waste Management Board (CIWMB) included a section on Business Waste Characterization which provides a composition analysis of the solid waste produced by California’s private sector. California’s “Business Waste” comes from the same private sector elements as Rhode Island’s “CSW”. With the cautionary note that Rhode Island’s CSW includes a significant amount of residential waste, the California data do provide some clues concerning the nature of the CSW stream in Rhode Island. Because CIWMB provides composition estimates for individual Standard Industrial Classifications (SIC), an estimate of the Rhode Island commercial sector waste composition can be obtained by adjusting the estimates to reflect the industrial make up of Rhode Island. The CIWMB data was combined with Rhode Island employment by SIC code in 2000 to obtain the estimates in Table 171-6-1.

Table 171-6-1 Estimated Rhode Island Business Sector Waste Composition *

Category	Material	Percent	PA Study ¹
	Uncoated Corrugated Cardboard	7.0%	
	Paper Bags	0.7%	
	Newspaper	3.3%	
	White Ledger Paper	3.7%	
	Colored Ledger Paper	0.3%	
	Computer Paper	0.5%	
	Other Office Paper	1.9%	
	Magazines and Catalogs	2.3%	
	Phone Books and Directories	0.3%	
	Other Miscellaneous Paper	4.8%	
	Remainder/ Composite Paper	12.2%	
Paper Total		36.9%	35.8%
	Clear Glass Bottles & Containers	1.1%	
	Green Glass Bottles & Containers	0.3%	
	Brown Glass Bottles & Containers	0.2%	
	Other Colored Glass Bottles & Containers	0.0%	
	Flat Glass	0.1%	
	Remainder/ Composite Glass	0.6%	
Glass Total		2.4%	2.4%
	Tin/Steel Cans	0.8%	
	Major Appliances	0.0%	
	Other Ferrous Metal	2.5%	
	Aluminum Cans	0.2%	
	Other Non-Ferrous Metal	0.2%	
	Remainder/ Composite Metal	2.5%	
Metals Total		6.2%	5.1%
	HDPE Containers	0.7%	
	PETE Containers	0.4%	
	Miscellaneous Plastic Containers	0.7%	
	Film Plastic	4.8%	
	Durable Plastic Items	2.8%	
	Remainder/ Composite Plastic	1.9%	
Plastics Total		11.3%	12.4%
	Food	14.4%	
	Leaves & Grass	4.5%	
	Prunings & Trimmings	0.7%	
	Branches & Stumps	0.1%	
	Agricultural Crop Residues	0.0%	
	Manures	0.2%	
	Textiles	2.6%	
	Remainder/ Composite Organic	4.8%	
Organics Total		27.4%	31.5%
	Concrete	0.4%	
	Asphalt Paving	0.1%	
	Asphalt Roofing	0.0%	
	Lumber	7.0%	
	Gypsum Board	1.1%	
	Rock, Soil & Fines	1.0%	
	Remainder/ Composite Construction & Demolition	1.2%	
C&D Total		10.8%	Not Included
	Paint	0.1%	
	Vehicle & Equipment Fluids	0.1%	
	Used Oil	0.0%	
	Batteries	0.1%	
	Remainder/ Composite Household Hazardous	0.1%	
HW Total		0.3%	Not Included
	Ash	0.1%	
	Sewage Solids	0.0%	
	Industrial Sludge	0.0%	
	Treated Medical Waste	0.0%	
	Bulky Items	1.6%	
	Tires	0.4%	
	Remainder/ Composite Special Waste	1.9%	
	Mixed Residue	0.7%	
Other Total		4.7%	
In Organics		Not Included	12.8%
Grand Total		100.0%	100.0%

*Estimates were obtained by combining the Rhode Island Economic Development Corporation's listing of businesses with 50 or more employees classified by SIC code (2000) with CIWMB waste generation and composition estimates by Industrial classification (<http://www.ciwmb.ca.gov>).

¹Pennsylvania DEP 2001 Statewide MSW Characterization Study

Table 171-6-2 Commercial Solid Waste Disposed of at the Central Landfill in Johnston from 1996 Through 2005

Year	Tons
1996	353,438
1997	508,135
1998	731,270
1999	619,171
2000	619,690
2001	640,432
2002	642,498
2003	677,698
2004	719,075
2005	711,709

These figures do not account for CSW disposed at other locations, the portion of the CSW that has been historically recycled, or increases in commercial recycling from 1996 through 2005, although it is a very safe assumption that, based on the discussion in Part 5, 100 percent of the CSW generated in Rhode Island is being tipped at the Landfill. When considered in context with the waste composition data, it is estimated that at least 300,000 tons per year of material from the CSW stream could be recycled.

6-4-2-2 Background

Formal commercial recycling programming was launched in 1989, with the DEM assuming the role of lead agency and RIRRC sponsoring complementary programs and providing funding for DEM's activities. For several years, the DEM and RIRRC participated as partners in sponsoring commercial recycling programs and activities. However, neither the DEM nor RIRRC has been active in commercial recycling for more than five years.

The commercial recycling plans that businesses were required by regulation to file with the DEM proved to be impractical, unrealistic, and impossibly difficult to obtain widespread compliance in a cost-effective manner.

RIRRC's efforts to enforce the regulation prohibiting the landfilling of loads of CSW containing 20 percent or more recyclables proved to be cost-prohibitive and difficult to enforce.

6-4-2-3 Federal and State Regulations

- 1) **Federal:** Presently, there are no federal regulations regarding the recycling of CSW.
- 2) **State:** The Rules and Regulations for Reduction and Recycling of Commercial and Non-Municipal Residential Solid Waste were promulgated in October 1996 under the authorities of Sections 23-18.8-2, 23-18.9-1, 23-18.9-7, 23-19-3, 23-19-5, 37-15, 42-17.1-2, 42-17.6, 42-20.16, and 42-35 of the Rhode Island General Laws of 1956, as amended. The regulations have three main purposes. First, the materials that must be recycled are defined. Second, the regulations establish the requirement that recyclables must be segregated

and maintained in good condition. Third, parties are identified that must prepare and submit a waste prevention and recycling plan, implement that plan, and report annually on the progress of the implementation. The regulations define the following materials as recyclable and require they be segregated from CSW:

Aluminum	Automobiles	Coated unbleached kraft beverage carriers
Corrugated cardboard	Glass food and beverage containers	Laser toner cartridges
Leaves and yard waste	Newspaper	High density polyethylene (HDPE) plastic milk and water containers
Office papers	Polyethylene terephthalate (PET) plastic soft drink containers	Steel, and tin coated steel cans
Telephone directories	Used lubricating oil	Vehicle batteries
White goods	Clean wood waste.	

The following materials are defined as recyclable and must be segregated from non-municipal residential solid waste:

Aluminum	Glass food and beverage containers	Leaves and yard wastes
Newspaper	High density polyethylene (HDPE) plastic milk and water containers	Polyethylene terephthalate (PET) plastic soft drink containers
Steel and tin-coated steel cans	Telephone directories	White goods

The regulations require that private and institutional employers of 50 or more workers and owners of multi-unit housing who generate non-municipal residential waste submit to the DEM a plan that must include a waste audit and descriptions of the employer's recyclables separation and waste reduction plans. The regulations require that the plans be implemented after approval by the DEM and that progress reports be filed annually.

The regulations prohibit solid waste management facilities from accepting for disposal any CSW containing more than twenty percent by weight of recyclables.

6-4-2-4 Current Status of Commercial Recycling

In 2003, the RIRRC provided a grant of \$102,000 to CleanScape, Inc. of Providence which is dedicated to the business of obtaining recyclables from commercial accounts and re-marketing them. The grant enabled CleanScape to purchase the recycling containers necessary to service small to mid-sized businesses, an underserved market segment. CleanScape has deployed all containers purchased through this grant, and has made additional container purchases to meet a slowly growing demand.

CleanScape and SORT, a recycling collection service operated by the Blackstone Valley Chapter, RI Arc, are the only firms doing business in Rhode Island that are dedicated solely to the collection and marketing of recyclables from business and industry. In FY 2004 and FY 2005, RIRRC provided grants of \$25,000 and \$35,000 respectively, to SORT for the collection of recyclables from schools that could not afford collection services.

A substantial (although unknown) amount of recycling of paper, cardboard and textiles is done by traditional scrap firms, such as Berger & Company and United Paper Stock, who have been in business in Rhode Island for decades handling all types of scrap.

Commercial recycling is also done at private and publicly-owned solid waste transfer stations which generally have the space and some equipment for separating recyclables from the commercial waste stream.

Also in 2003, the RIRRC began operating the Tipping Facility, a transfer station in which solid waste can be tipped more quickly and safely than at the operational face of the Landfill. The Tipping Facility enables RIRRC to remove recyclables from the CSW stream, mostly scrap metal, corrugated cardboard, and clean wood. Over the first year of its operation, the amount of recyclables recovered from the CSW stream has steadily and rapidly increased with RIRRC staff reporting an average of more than 100 tons per day of cardboard, wood, and metal being recovered by the spring of 2005. Further, RIRRC in Fiscal 2005 installed an eight-person sorting station in the form of an automated belt for the purposes of separating cardboard, wood, and metal from the CSW stream which is expected to at least double the amount of material extracted at the Tipping Facility.

In order to assist small generators, RIRRC operates a drop-off site for recyclables at the Landfill complex. The site currently accepts mixed recyclables, newsprint, corrugated cardboard, mixed wastepaper, telephone directories, and scrap metal. This site alone, however, will not prompt large increases in commercial recycling.

As indicated in earlier sections of this Plan, residential solid waste from apartment and condominium buildings is classified as CSW. Consequently, recyclables from these residential units are classified as commercial recyclables despite the fact that they are identical in nature to municipal recyclables and they are subject to a tipping fee at the MRF set at the discretion of the RIRRC Executive Director.

In April 2005, RIRRC launched a pilot program to divert from landfilling the plastic material used to wrap boats after they have been hauled from the water and placed into winter storage at marinas. In cooperation with the American Plastics Council, RIRRC made a grant of \$15,800 to the RI Marine Trades Association to fund the program, which had recovered and recycled more than 15 tons of plastic wrapping from 19 participating marinas during its first month of operation.

There were no other active State commercial recycling programs to help private firms comply with the statute that requires all businesses to separate recyclable materials from the CSW they generate and to market them. With the exception of the aforementioned programs source separation of traditional recyclables from CSW occurs entirely independent of RIRRC

or DEM.

It should be noted here that RIRRC operates major programs that divert hundreds of thousands of tons of C&D debris, waste tires, white goods, leaf and yard debris, household hazardous waste, and electronics from landfill disposal and has developed a program to divert mattresses from landfilling. These programs are discussed in greater detail in Part 7.

6-4-2-5 Findings

The Tipping Facility has become RIRRC's de facto principal CSW recycling facility. It is expected that the MRF will continue to expand its production of recyclable materials.

Because of the lack of State involvement with commercial recycling and the competitive nature of the commercial waste paper firms doing business in Rhode Island, it is impossible to accurately determine the extent of commercial recycling by the private sector. It can however, be concluded that because of the program vacuum in this area, there is significant potential for increasing the level of commercial recycling.

Surveys conducted by RIRRC staff since 2001 indicate substantial volumes of cardboard, paper, and clean wood continue to be disposed at the Landfill. These surveys confirm that substantial additional diversion of commercial recyclables from landfilling is possible.

The commercial recycling reporting system described in DEM's *Rules & Regulations for Reduction and Recycling of Commercial & Non-Municipal Solid Waste* does not work. RIGL 23-18.8-2 and 23-18.9-1, the statutes that require all businesses and institutions to recycle, have not been effectively enforced for more than 15 years. In general, small businesses and institutions do not recycle, claiming they do not have the space to store source-separated recyclables. Furthermore, enforcement of the provision in the aforementioned regulations prohibiting the landfilling of loads of trash containing 20 percent or more recyclables is impossible.

The failure of the existing regulatory framework and the difficulty of securing statutory compliance by small businesses is no reason to abandon mandatory source separation and recycling by all companies and institutions. It is important that Rhode Island not discard the ideal of source separation and recycling in the commercial, industrial, and institutional sectors. It is equally important that the state develop an approach to commercial recycling that is practical, workable, and enforceable.

There are no facilities in Rhode Island designed and dedicated solely for the purpose of separating recyclables from the non-segregated CSW stream. Such a facility could vary in sophistication from a building with complex sorting equipment for the receiving and separation of recyclables from the CSW stream to a simple concrete pad where recyclables are recovered from CSW tipped on the ground. Representatives of the hauling industry have indicated that there is a need for a commercial recyclables sorting facility and that such a facility, whether operated by RIRRC or privately, would be used by haulers to recover recyclables from the CSW stream.

RIRRC has always limited the volume of commercial recyclables accepted at the MRF and

charged a tipping fee for them to ensure the facility did not compete with existing private sector recyclable processing facilities and that its capacity availability remained assured to municipalities. However, competition with the private sector is no longer a concern, and several retrofits since 1996 that have more than doubled the MRF's capacity have ensured its capability to process all municipal recyclables that could be delivered to the facility. According to haulers, the MRF tipping fees for commercial recyclables served to discourage their delivery to the MRF.

6-4-2-6 Actions

1. DEM shall initiate rule-making as expeditiously as feasible to eliminate the commercial recycling reporting and regulatory system set forth in the *Rules & Regulations for Reduction and Recycling of Commercial & Non-Municipal Solid Waste*, September 1996 and shall replace it with a new approach to the regulation of commercial recycling that will include establishment of a statewide commercial recycling goal and shall be coordinated with the RIRRC commercial recycling program set forth in Recommendation 7 below.
2. DEM shall initiate rule-making as expeditiously as feasible to rescind its regulation prohibiting the landfilling of loads of CSW containing 20 percent or more recyclables.
3. DEM, partnering with RIRRC for enforcement purposes, shall adopt regulations by March 31, 2008 banning generators and commercial haulers from delivering for landfill disposal all electronics, as defined in Part 1 of this Plan; waste tires; and all materials designated as recyclable in its Rules and Regulations for Reduction and Recycling of Commercial and Non-Municipal Residential Solid Waste, dated September 1996.
4. With respect to the regulation of licensed or registered transfer stations and recycling facilities, commencing July 1, 2008, the DEM shall integrate the management of recyclables more aggressively into its approvals for the operation of such facilities.
5. Commercial recyclables shall be accepted at the MRF with no tipping fee, provided that the MRF's ability to accept and process all municipal recyclables is not impaired. Within three months of the adoption of this Plan by the SPC, RIRRC shall develop a form-of-contract that shall be required uniformly for the delivery of recyclables from the CSW stream to the MRF at no tipping fee. The form-of-contract shall, at minimum, specify: 1) the types and quality standards of acceptable commercial recyclables which shall be the identical materials accepted at the MRF in the municipal program and the identical quality standards applied to municipal recyclables; 2) that all qualified recyclable materials from the specified commercial generator be delivered, in both bad and good markets; 3) delivery, inspection, acceptance, and rejection procedures; and 4) all other terms and conditions necessary to govern the delivery of commercial recyclables to the MRF for no tipping fee. Upon publication of the form-of-contract, RIRRC shall make it available. The acceptance of residential recyclables from the CSW stream should be targeted

because the MRF was designed to process residential recyclables (also see section 6-4-5-4, recommendation 3).

6. Commencing with Fiscal Year 2008, RIRRC should consider establishing a three-tiered commercial solid waste disposal tipping fee structure, including 1) a non-contract rate; 2) a standard contract rate; and 3) a rate for CSW that violates DEM's commercial recycling regulations. The latter shall be higher than either of the other two rates.
7. RIDEM shall, by January 1, 2009, develop a diversified commercial recycling program that could include: 1) technical assistance, including workshops and seminars; 2) the development and distribution of outreach, educational, training, and marketing materials and programs targeted at business, industry, and institutions; 3) promotion of Rhode Island companies that recycle; 4) programs that recognize and reward companies that make outstanding achievements in recycling; 5) an investigation that explores various means and approaches by which municipalities can help small businesses recycle; and 6) the provision of commercial waste/recycling audits on request.
8. DEM shall develop a program under which companies and/or municipalities, if appropriate, would be allowed to "adopt a school" and subsidize the school's recycling costs or similar environmentally beneficial programs as a means of offsetting penalties for environmental violations. This program should be developed by March 31, 2008.
9. RIRRC or DEM shall continue the program collecting and recycling plastic boat wrapping material.
10. Effective for FY2008, RIRRC shall modify its commercial contracts from a 100 percent put or pay requirement to an 85 percent put or pay requirement. Thereafter, RIRRC Commissioners shall continue to reduce the put or pay requirement reaching a 75 percent put or pay requirement.
11. DEM shall explore the inclusion of commercial recycling compliance evaluations as part of its regular inspection of Rhode Island businesses.

6-4-3 State Agency Recycling

6-4-3-1 Background

In Rhode Island, recycling of 17 items is required for all state agencies under DEM's *Regulations for Reduction and Recycling of Commercial and Non-Municipal Residential Solid Waste*. Under Rhode Island General Law 42-20-16, all state agencies must submit a recycling plan to the DEM. This is a coordination, monitoring, and enforcement program that has not been actively implemented and enforced by the DEM for more than six years.

6-4-3-2 Current Status of State Agency Recycling

With the departure of the DEM from its former activities as central coordinator and monitor

of State agency recycling, the centralized focus for State agency recycling shifted to the Rhode Island State Division of Purchases because of its responsibility for issuing master contracts for the services used by State agencies.

Between 1996 and 2001, state agencies were left to their own devices with respect to recycling, which consequently occurred sporadically at best throughout state government. In 2001, the Division of Purchases moved to procure trash removal and recyclables collection services under two separate and independent contracts. In September 2001, the Division awarded a contract to CleanScape, Inc. of Providence, to collect recyclables from all state agencies. By 2004 CleanScape had established regular recycling programs for 30 state agencies in more than 130 buildings, collecting and marketing more than 900 tons of material during 2003, predominantly various types of papers and corrugated cardboard but also including bottles and cans. Not all state agencies had been phased into recycling by 2004 and CleanScape was moving to introduce recycling to those agencies not yet doing so. CleanScape officials estimated that about 50 percent of the waste paper generated by state offices is being captured by this program although there is no way available at the time this Plan was adopted to verify this estimate or to accurately estimate the amount of waste paper generated by state government. CleanScape provides a detailed report of recyclables quantities by type of material, month, and agency to the Division of Purchases and RIRRC.

State agency recycling has been materially aided by RIRRC, which has provided CleanScape, free of charge, with more than 2,000 specially designed blue and green recycling containers for placement in each State office in addition to the \$102,000 grant referred to in Section 6-3-2, Commercial Recycling. This cooperative arrangement was ongoing in 2006, with RIRRC providing whatever containers CleanScape needs for the program of State agency recycling.

State agency recycling is performed almost entirely within the scope of services of the CleanScape contract. In addition to collecting recyclables, CleanScape works with each State agency in designing agency-specific programs and providing training to state personnel. CleanScape officials indicated that they will continue to expand this program to the fullest extent of cooperation and participation afforded by State agency personnel.

6-4-3-3 Findings

State agency recycling as conducted by CleanScape has proven to be far more successful in terms of participation by State agencies and in terms of the quantity of recyclable materials diverted from landfilling than the programs conducted solely by DEM.

There is no reason why State agencies should not comply with a system of reporting annually to the DEM concerning their recycling program performance.

There was no good barometer of recyclables extraction and participation rates in State agencies as of 2004.

6-4-3-4 Actions

1. DEM should complete a review of the regulations that require State agencies to

submit recycling plans and reports in order to streamline them and make them as workable as possible. In parallel with the regulatory review, it is recommended that the DEM conduct a simple but thorough survey of all State agencies to gather recycling-related data it deems appropriate, including, but not limited to generation and extraction rates pertaining to recyclables. The survey and the process of regulation review and amendment should be completed by June 30, 2007. The amended regulations should, at a minimum, enable the DEM to regularly monitor recycling extraction and participation rates by State agencies. The DEM should actively implement and enforce the amended regulations concerning State agency recycling.

2. As part of its effort to improve State agency recycling, the DEM shall work with stakeholders to develop a recognition program for state agencies that undertake and accomplish outstanding recycling achievements.
3. The Division of Purchases is commended for taking the initiative to issue a contract for State agency recycling. It is recommended that the Division continue its policy of issuing for bid contracts for State agency recycling services; the DEM and RIRRC will work with the Division to ensure that the optimum specifications are included in the contracts.

6-4-4 Multi-Family Recycling

6-4-4-1 Background

For the most part, solid waste generated in multi-family residential buildings, the disposal of which is not provided for by the municipality but that is instead disposed of commercially, is regarded as CSW in Rhode Island. There are some exceptions to this general rule, because several municipalities do provide solid waste management services for condominium complexes. The DEM Regulations for the Reduction and Recycling of Commercial and Non-Municipal Residential Solid Waste, as amended in October 1996, specify that the same materials must be recycled as the ones in the curbside municipal program. Most of the residential recyclables recovered from multi-unit residential buildings or complexes are marketed directly by the private haulers and not delivered to the MRF. The quantity of these recyclables that is received at the MRF is not known although it is believed to be insignificant.

6-4-4-2 Current Status of Multi-Family Recycling

The DEM regulations require managers of multi-unit housing to submit to DEM and (if applicable) to the municipal recycling coordinator, comprehensive, detailed waste prevention and recycling plans and a waste audit. These regulations and the regulation requiring multi-family units to begin recycling no later than 180 days after the municipality begins its mandatory recycling program have not been enforced for years.

DEM has not been involved in multi-family recycling in any way for more than seven years and RIRRC's involvement has become minimal. The technical assistance, hands-on work with haulers and apartment complex managers, and the recycling bins once provided to trash

haulers or apartment managers are no longer provided. By 2005, government agency involvement with multi-family recycling was confined to a modicum of programs conducted by some municipalities.

Recycling by multi-family residential buildings whose trash disposal is not provided for by the municipality occurs with virtually no involvement by government at any level. Consequently, there is no accurate information available concerning the quantity of recyclables extracted or recycling participation rates. About 71,000 or approximately 16 percent of Rhode Island's total residential dwelling units are located in buildings with four or more apartments. It is not known if the multi-family buildings that had implemented recycling programs with the assistance of RIRRC or the DEM have maintained their recycling activities nor is it known if any additional multi-family buildings have begun to recycle in the past eight years.

The state's new land use plan, *Land Use 2025*, attempts to direct higher density residential development to already urbanized parts of the state and to newly designated growth centers. An important component in implementing this concept may include multi-family housing. This housing option, both today and in the future, needs to be captured in terms of recycling in order to support the goal of extended landfill life.

6-4-4-3 Findings

Multi-family residential buildings for which the municipality does not provide solid waste management services is a sector with which the DEM and RIRRC are out of touch.

There is no data concerning how much recycling is occurring in the multi-family residential sector, a sector that represents about 16 percent of Rhode Island's housing stock.

6-4-4-4 Actions

1. DEM should review its regulations concerning recycling in multi-family dwellings to determine how practicable and workable they are. These regulations should be modified so that they are practicable, workable, and easily enforceable by DEM. Other partners, including the municipalities themselves, may also need to play a role in improving recycling participation within multi-family housing developments.
2. It is also recommended that the DEM consider implementing a self-certification program for multi-unit residential buildings or complexes with central management. Such a program should emphasize the role of private sector waste haulers in providing the infrastructure and collection services for this non-municipal residential recyclable material. This program should be in place by June 30, 2007.
3. RIRRC should, upon adoption of this Plan by the SPC, eliminate the tipping fee at the MRF for residential recyclables recovered from multi-unit residential programs established under a DEM self-certification system as set forth in the preceding paragraph. This would be contingent upon a demonstration that residential recyclables from multi-family housing do not create negative economic or capacity impacts on the MRF. The tip fee-free recyclables from multi-unit housing should be

accepted at the MRF according to terms and conditions to be specified by RIRRC. By law, the MRF's capacity must remain available without qualification to municipalities to receive and process all recyclables that are extracted from the municipal waste stream.

4. It is recommended that RIRRC work with trash haulers and municipalities to develop a database concerning recycling activities and programs underway in multi-family complexes and it is further recommended that, based on this basic research, the RIRRC should seek to re-start an active multi-family recycling program by developing an integrated program of educational materials and technical assistance for multi-family recycling. This program should be ready by September 1, 2007
5. It is also recommended that the RIRRC should determine the demand for recycling bins for apartments and, if warranted, should consider establishing a program providing them. This program should begin by December 31, 2007.

6-4-5 School Recycling Program

6-4-5-1 Background

Implementing recycling programs in Rhode Island's public and private schools (K-12) is important for a number of reasons, but perhaps the most important is that it helps instill a conservation ethic and good recycling habits in children. School recycling is governed by both the commercial and municipal recycling regulations, depending on the district. Public schools can use municipal recycling trucks and tip commingled recyclables at the MRF for no charge; private schools cannot, because their solid waste and recyclables generally fall into the commercial category. The *Regulations for Reduction and Recycling of Commercial and Non-municipal Residential Waste*, regulate school recycling; ferrous and glass food and beverage containers, aluminum, PET, HDPE, newspapers, and classroom and office papers are collected from schools.

From the inception of mandatory recycling in 1989, schools have been a very specialized and very difficult area in which to achieve recycling success. Management of buildings is usually decentralized to the individual structures that frequently do not have the committed program coordinators necessary for successful recycling. School department administrations, which are usually independent of the municipality's management and administrative control, are often hostile or indifferent to recycling because of recycling's added costs and work burdens. The hands-on management attention necessary to sustain successful recycling over a long term are often absent in schools. Other barriers to school recycling have included storage and collection difficulties and stringent fire codes. Enforcement has been virtually nonexistent.

6-4-5-2 Current Status of Schools Recycling

With school recycling lagging badly behind residential recycling, RIRRC took action in the fall of 2001 to reverse the trend and attempt to revitalize the schools recycling program. It established the Rhode Island Schools Recycling Club (RISRC), which has proven to be an innovative and inexpensive means of reinvigorating school recycling statewide. The RISRC

is a collaboration between RIRRC, which funds it at an annual cost of about \$30,000, the Environment Council of R.I. Education Fund, and Triple M Productions, which operates it. It works with school officials, conducts trash audits for schools, evaluates the recycling activities and achievements of each of the state's public schools, and issues report cards to each school grading them on their recycling performance. The schools with outstanding achievements were recognized with awards and citations. By 2003, the RISRC had resulted in a 42 percent increase in elementary school recycling and a 22 percent increase in middle school recycling.

As of 2005, RIRRC was continuing this program as a means of challenging students, parents, teachers, principals, and administrators to create a process whereby all of their schools' paper will be separated from the trash and sent to a recycling facility. Each school was sent program information and asked to complete progress reports that provided valuable data and enabled RISRC to determine which schools needed more assistance. All schools were personally visited by RISRC which evaluated their performance and verified the data they provided. The program has generated widespread publicity.

In 2002, RIRRC made a \$25,000 grant to the City of Providence to undertake a pilot program to collect recyclables from the city's schools and to enable RIRRC to measure the cost, recycling effectiveness, and diversion potential of an increased level of participation by the RIRRC with schools recycling statewide.

The RIRRC provided other support for schools recycling including provision of nine-gallon classroom recycling bins and 65-gallon recycling carts, as appropriate, both at no charge to the schools.

6-4-5-3 Findings

School recycling programs at all education levels have met with limited success. There needs to be a much greater effort to recycle waste generated in these public and private institutions.

One of the objectives of the school recycling program is to sensitize students to be aware to the need to conserve natural resources; one part of this is making recycling program participation second nature.

There is a need to impress upon school district administrators and the officials responsible for the operation and maintenance of school buildings of the importance of recycling.

Virtually all programs require intensive follow-up monitoring and correction, and are difficult to maintain year after year, especially in middle and high schools without constant attention, which has often been absent.

Schools with established coordinators have more successful programs than those without immediate oversight, and school recycling programs appear to be more active and productive with RIRRC involvement.

6-4-5-4 Actions

1. Because the operation and maintenance of school buildings is decentralized, building supervisors and the maintenance staffs of individual buildings should be trained concerning the recycling and importance of recycling by June 30, 2008.
2. RIRRC will continue to support the R.I. Schools Recycling Club.
3. The DEM should review its regulations and enforcement policy to determine the most cost-effective and practicable approach to enforcing school recycling, and if necessary, pursue additional funding in order to increase schools' compliance with recycling requirements. This regulatory activity should begin by June 30, 2008.

6-4-6 Recycling Market Development

6-4-6-1 Background

The term "Market Development" in the context of solid waste management consists of activities that provide or stimulate demand for materials diverted from the waste stream or the utilization of materials that would otherwise have been disposed of as solid waste.

One of the most ambitious and important recycling market development programs ever undertaken in the Northeast was initiated in Rhode Island with enactment of a statute in 1991 requiring that within 10 years, newspapers in the state must use newsprint with a minimum of 40 percent post-consumer recycled content. In 1997, the Northeast Recycling Council (NERC) assumed leadership of a program to attain this goal in its region that includes the states of New England, New York, New Jersey, Pennsylvania, and Delaware. After years of aggressive efforts by newspaper publishers, the Northeast states, and NERC, it became clear that a regional goal of 40 percent goal was unattainable because not enough recycled content newsprint was being produced to enable the newspaper industry to attain this objective. Nevertheless, as a result of continuing efforts by NERC and the region's newspaper publishers that took into account the realities of the recycled newsprint supply situation, the NERC states adopted a regional policy in 1999 to attain at least a 27 percent recycled content level in the newsprint used in the region. By 2001, NERC was able to report that 28.8 percent of the newsprint consumed in the Northeast contained post-consumer recycled material.

There is wide diversity in the market development programs of other states, ranging from the huge California market development program with its staff of 70 and annual budget of seven million dollars to states such as Rhode Island with no formal program. The materials most frequently the subject of market development program attention in other states are electronics, organics/food wastes, and C&D. Carpeting, plastics, and tires are also targeted for market development by some states.

6-4-6-2 Current Status of Recycling Market Development

A major source of information and guidance concerning recycling market development is provided by the EPA and is available online at EPA's "Jobs Through Recycling (JTR) Program" web page, which can be accessed at the home page of EPA's Office of Solid

Waste, www.epa.gov/osw. The JTR initiative puts the tools of business development—technology transfer, information sharing, financing, and marketing—into the hands of recycling professionals. JTR facilitates cooperation and communication among solid waste officials, economic development organizations, and businesses involved in collecting, processing, and remanufacturing recovered materials. In achieving these results, JTR projects ranged from conducting composting demonstration projects in rural communities to organizing financing meetings with venture capitalists and other potential investors. JTR offers a wide range of advice and technical assistance to organizations, including public agencies, concerning recyclables market development.

A number of regional recycling market development programs and activities are available and accessible to Rhode Islanders through NERC. The size of Rhode Island and the nature of its economy limit the potential scope of a formalized recycling market development program. Therefore, Rhode Island, represented by RIRRC, supports and participates in NERC's activities and programs. NERC is a regional organization working directly with the state agencies of its 10 member states to promote recycling market development. NERC'S mission is to “leverage the strengths and resources of its member states to advance an environmentally sustainable economy in the northeast by promoting waste prevention, recycling, and the purchasing of environmentally preferable products and services.” NERC is the only forum in the region for cooperative research, collaborative action, and networking on regulatory, market and business development issues that link recycling and economic development. A compendium of completed and current NERC market development projects can be found on its web site, www.nerc.org/.

An example of a recycling market development program, which was sponsored by RIRRC in partnership with NERC, was the Recycling Business Financing Seminar held in 2001. RIRRC also partnered with the R.I. Economic Development Corporation, the U.S. Small Business Association, the Small Business Development Center, and Fleet Financial Services to sponsor the seminar. The seminar was designed to assist those professionals who work with small businesses to better understand the recycling industry, the value of recycling enterprises, and to help them more effectively assist recycling entrepreneurs with developing their business plans and obtaining necessary financing.⁷

6-4-6-3 Findings

Although the DEM had initially taken the lead in market development, maintenance of this role would have conflicted with the agency's primary regulatory role.

There was no other state agency operating a recycling market development program in 2005 and the state's size is a major constraint to the establishment of such a program in Rhode Island. None of the materials processed at the MRF are shipped to end-markets within the state.

⁷ For further details concerning market development activities, see the report filed by the Market Development Subcommittee of the Working Group for the Comprehensive Plan.

Because of the above-referenced limitations, it is unlikely that a formal recyclables market development program will be established at any agency within state government.

At one time, the DEM maintained a list of businesses throughout the region that accepted materials for recycling. This list of potential markets, which is no longer available, would be helpful to companies generating recyclable materials and seeking to market them. RIRRC, the DEM and EDC have been working to provide a comprehensive array of environmental-related services using the Earth 911 website for Rhode Island businesses seeking information and assistance concerning resource conservation, waste reduction, and recycling.

6-4-6-4 Potential Initiatives

1. **Marine Bio Conversion (MBC) squid waste utilization project.** With financial assistance from the Slater Center for Environmental Biotechnology, MBC has been working on converting squid processing wastes that are currently landfilled or barged out for ocean dumping into high value specialty aquaculture feed ingredients and seafood flavors. MBC is seeking additional funding to prove that this “Bioconversion” can be a viable approach to solving the waste disposal problems while simultaneously gaining economic return.
2. **Glass Cullet.** Applications for glass cullet such as aggregate could offer alternatives to use as a supplement to alternate daily cover. Whether or not this would be necessary will depend on the volume of cullet generated by the MRF and the capacity of the Landfill to utilize all the cullet available. At least one municipality has expressed interest in utilizing glass cullet as aggregate in construction projects.
3. **RIRRC Industrial Park.** The Corporation began planning in 2000 for the development and construction of an industrial park adjacent to RIRRC facilities that could potentially site firms whose business involved recovering materials from the waste stream and processing recovered materials to create value-added products.

6-4-6-5 Actions

1. In 1997, the DEM produced a directory of recycled products available for purchasing that was targeted at municipal purchasing officials. However, the DEM no longer maintains the directory. DEM shall by January 1, 2008 produce the directory. RIRRC should work toward facilitating the availability and procurement of products with recycled content.
2. Through its participation in NERC, the DEM shall work to oppose unintended or unnecessary regulatory hurdles that would hinder market development.

6-4-7 Leaf and Yard Waste Composting

6-4-7-1 Introduction/Nature of the Material

Composting is the controlled, aerobic (in the presence of oxygen) degradation of organic

materials that relies on a natural process which results from the decomposition of organic matter by microorganisms. The composting process occurs in two major phases. In the first stage, microorganisms decompose the composting feedstock into simpler compounds, producing heat as a result of their metabolic activities. The size of the composting pile is reduced during this stage. In the second stage, the compost product is “cured” or finished.

Compost is a humus-like soil amendment that improves soil porosity and aids in water and nutrient retention. Much of the municipal waste stream is readily compostable. RIRRC’s Waste Composition Study estimates that yard waste, including leaves, grass clippings, weeds, and brush and tree prunings, constitutes 13.5 percent of the municipal waste stream and 12.2 percent of the combined municipal and commercial waste streams (This estimate may be low because many municipalities manage their leaves locally and thus are not accounted for in the Corporation's Waste Composition Study). Composting this material will have a far less detrimental effect on the environment than landfilling or incinerating and will yield a useful product. The removal of yard waste from the waste stream can preserve disposal capacity, reduce disposal costs, and generate a useful soil amendment.

Leaves are light in weight and relatively easy to compost. Carefully managed leaf compost operations produce a finished, stable product in twelve months or less. Other yard wastes can be composted as well, but may require more time and careful management. Bushes and branches must be chipped or shredded before being added to compost because their tough, woody structure and relatively low amount of nitrogen cause them to decompose slowly. Grass clippings are high in nitrogen and speed up the decomposition of leaves but must be carefully managed to control odor and runoff.

6-4-7-2 Federal and State Regulations

There are no federal statutes or regulations that affect the operation of leaf and yard waste composting operations. An impressive amount of data concerning composting, including extensive reference materials, publications, and many links to useful websites can be found at EPA’s composting website, www.epa.gov/epaoswer/non-hw/compost/index.htm.

Leaf and yard waste composting is regulated under the DEM Regulation No. 8, Solid Waste Composting Facilities, adopted in January 1997 and amended in April 2001.

6-4-7-3 Background

From the late 1980s until the mid-1990s, the DEM and RIRRC focused their efforts on working with municipalities by providing grant funding, technical assistance, and coordinating several demonstration and model composting projects to develop municipality-specific centralized, citizen drop-off leaf and yard debris windrow composting projects. In 1990, RIRRC began funding municipalities to develop curbside leaf and yard debris collection programs using paper bags.

In addition to facilitating the development of operating collection projects, RIRRC and the DEM conducted training sessions and published a number of informational and how-to materials to assist municipalities in developing and operating centralized leaf and yard debris composting sites.

To assist municipalities that have been unable to site composting facilities locally, RIRRC opened a windrow composting operation adjacent to the Landfill. This site accepts commercial or municipal leaf and yard wastes delivered in bulk or in paper bags.

In the early to mid-1990s, approximately 15 municipalities developed and registered, according to the DEM regulations, centralized leaf and yard debris windrow facilities. However, since 1997, about half of these communities abandoned their efforts in favor of either sending their leaf and yard debris to the RIRRC's composting facility or to commercial composting operations. In 2003, there were 15 large leaf and yard debris windrow composting facilities in operation in Rhode Island, eight municipal, six commercial, and RIRRC's.

According to the DEM data, these windrow composting operations process about 73,000 tons of leaf and yard waste annually, a bit more than half of the leaf and yard waste in the total Rhode Island solid waste stream of approximately one million tons annually. This means that between 55,000 and 65,000 tons of the leaf and yard debris estimated to be in the Rhode Island solid waste stream according to the Waste Composition Analysis of 1990 is either unaccounted for or finding its way into the Landfill.

6-4-7-4 Current Management Practices

Since 1997, municipalities have moved away from the development of their own windrow composting facilities to the development of curbside leaf and yard waste collection programs using paper bags. This trend developed to a large extent without the assistance of either the DEM or the RIRRC and was probably at least partially incentivized by a municipal leaf and yard waste tipping fee that was \$15.00/ton during the 1990s increasing to \$17.00/ton in FY 2000, providing a \$17.00 to \$15.00/ton cost avoidance against disposal.

In order to further encourage and incentivize the diversion of leaf and yard debris from landfilling, RIRRC, effective in FY 2004, eliminated its \$17.00/ton tipping fee for leaf and yard waste delivered by municipalities with recycling and disposal contracts. This is likely to serve as a major inducement to municipalities to take action to ensure that their leaf and yard waste is not included in their loads of solid waste delivered to the Landfill for disposal at a tipping fee of \$32.00/ton.

DEM and the RIRRC no longer have active programs promoting the development of centralized windrow facilities although the DEM did eliminate its composting site registration fees several years ago in order to remove an impediment to the development of windrow composting facilities.

The RIRRC continues to publish and distribute informational and educational materials concerning back yard composting. It also developed a large composting exhibit as part of the educational center at the MRF. However, the only major program designed to foster backyard composting that survived from the 1990s to 2003 is the RIRRC's program of making compost bins available to the public at discounts of 50 percent or more off the retail price, both at RIRRC's offices and at publicized sales at various locations throughout the state. More than 5,000 composting bins have been made available to the public through this program.

6-4-7-5 Future Management Practices

Given projected increases in tipping fees and a projected ban on landfill disposal, it is anticipated that most residential leaf and yard waste will be composted either locally or regionally within the next several years.

6-4-7-6 Findings

An estimated additional 55,000 to 65,000 tons of leaf and yard waste can be diverted from Central Landfill quickly at little or no cost with the implementation of appropriate regulatory and management programs by the DEM and the RIRRC.

Composting leaf and yard waste diverts material from disposal in landfills; it also creates a useful end-product that can substitute for expensive topsoil and other soil products.

User fees can increase participation in both backyard and municipal composting programs.

6-4-7-7 Actions

1. Leaf and yard waste should be banned from landfill disposal and directed toward proper composting operations by January 1, 2008. The ban should be implemented either by an amendment to the Rhode Island General Laws or by regulation promulgated by the DEM.
2. The ban should be enforced by a combination of the DEM monitoring and inspection of transfer station operations and contract management procedures to be instituted by RIRRC, which should also consider the addition of language to its commercial and municipal disposal contracts prohibiting the delivery of leaf and yard debris to the Central Landfill for disposal.
3. In anticipation of increased deliveries of leaf and yard debris as a result of the elimination of the municipal leaf and yard debris tipping fee, RIRRC should improve and expand its leaf and yard waste composting facility to serve additional municipalities and to compost additional materials by March 31, 2008. DEM shall approve this expansion.
4. Backyard composting (considered a form of waste prevention) should be given priority in the solid waste management system because it eliminates the need for transportation of leaf and yard waste and promotes the composting of other organic materials, such as food scraps, for which an effective large-scale composting method has not been developed. Therefore, RIRRC should continue with and expand its program of making compost bins available to the public at deep discount.
5. RIRRC should develop residential and school composting training programs as part of its waste prevention program, with the goal of educating students and homeowners about the fundamentals of composting, including the fundamentals of biodegradability, soil composition, resource conservation, and vermicomposting (worm composting) by March 31, 2008.

6. It is recommended that the RIRRC should maintain its policy in effect at the time of adoption of this Plan of receiving leaf and yard debris from municipalities free of charge.
7. The RIRRC will continue its effort to identify the most effective approaches to implementing backyard composting and to estimate the cost per/ton of managing waste in this manner.

6-4-8 Food Waste Management

6-4-8-1 Introduction

Food waste comprises approximately 15-25 percent of the residential waste stream, up to 90 percent of the food service industry waste stream, and significant portions of other industrial, commercial and institutional waste streams. However, food waste has not yet been targeted for large scale composting in Rhode Island. To date, the only efforts to promote food composting in the state have focused on small-scale, backyard composting of yard and food waste. The next step in diverting materials and maximizing the recovery of resources is to establish effective programs to compost food waste generated by businesses or institutions.

6-4-8-2 Residential

Since 1996, RIRRC has continued its long-standing program of publishing and distributing to schools, libraries and the general public how-to brochures and other informational materials concerning the composting of food waste in composting bins. All of the agency's informational materials concerning leaf and yard waste composting also address food waste composting.

6-4-8-3 Commercial/Institutional

In 1996, RIRRC conducted a workshop in Providence for the hospitality industry to explore the potentialities of large-scale food waste composting. Despite extensive advertising and direct mail efforts, attendance was very disappointing; only about 20 hotels and restaurants sent representatives to the workshop.

In 1996 and 1997, RIRRC dedicated considerable staff effort to working with the staff and students at Providence College and the University of Rhode Island in attempts to launch pilot food waste composting projects at the dining halls of those two campuses. Although significant amounts of time was spent in designing the projects, neither got off the ground.

At the time of adoption of this Plan, neither the RIRRC nor the DEM was actively engaged in any program for the composting of commercially generated food waste.

6-4-8-4 Current Status of Food Waste Management in Rhode Island

In 2005, RIRRC began an examination of the bulk food waste processing technology of International Bio-Recovery Corp. (IBR) to determine whether an IBR facility would be economically feasible, cost-effective, practicable, and an appropriate application in Rhode Island. The waste is ground, liquefied, "digested" or composted in a tank, pelletized, and

sold as liquid or solid fertilizers.

6-4-8-5 The National Situation

A growing number of public jurisdictions at the city, county, and even the state level are becoming involved with food waste composting. The largest project is being implemented by the city of Portland, Oregon, which had a goal of composting 10,000 tons of food waste in 2004, its first year of operation. Under Portland's mandatory program, a comprehensive and detailed analysis was performed to determine the generators and the amount of food waste available and the projected costs. The program is being phased in by initially targeting the 300 largest food waste generators.

A brief sampling of some of the hundreds of projects related to food waste composting that have been undertaken across the country include the following:

- The Massachusetts Department of Environmental Protection published a report in September 2002, characterizing and mapping the location of the major food waste generators in that state. The City of Boston published a report in August 1999 entitled "Strategies to Increase Food Waste Recycling in the Greater Boston Area".
- Sonoma and San Mateo Counties in California are conducting large-scale food waste composting projects.
- The City of Opaala, Hawaii has launched a mandatory food waste composting project with the material being composted coming from restaurants and markets that meet minimum size and generation requirements.
- The Seattle Chamber of Commerce promotes and provides technical assistance in order to facilitate food waste composting.
- Effective in March 2004, the City of Seattle began encouraging residents to recycle food and yard waste through composting by giving residents a 75 percent discount on Green Cone digester composting bins.
- The State of Colorado has published an institutional food waste composting guide.
- The State of Illinois has funded a food waste composting pilot project.
- The New Jersey Solid Waste Policy Board has published a step-by-step guide for developers of food waste composting facilities.
- The State of Maine funds at the University of Maine the "Maine Compost School" a one-week course to train people to run medium to large-scale commercial food waste composting facilities.

6-4-8-6 Findings

Because of the large percentage of food waste in the municipal waste stream, (up to 25 percent) food waste composting provides an opportunity to divert significant tonnage from

landfill disposal even if only a small fraction of the food waste generated is diverted.

Numerous food waste pilot projects with various collection strategies have been conducted throughout North America.

The implementation of user-fee programs can increase participation in residential food waste composting.

6-4-8-7 Actions

1. Analyses of food waste composting options should include: 1) an examination of the potential for working with local farmers and/or composters to compost food waste at existing facilities, and 2) an assessment of the need to construct additional composting facilities to manage food waste.
2. It is recommended that the RIRRC review the cost-benefit analysis and feasibility study conducted by the City of Portland that was used by that city as its decision document in implementing its mandatory food waste composting program in order to determine if the lessons learned in Portland can be adapted to Rhode Island. It is further recommended that the RIRRC also review the analyses and reports of the major government-sponsored food waste composting projects and studies to determine if their findings and conclusions can be extrapolated to Rhode Island. This review will be completed by June 30, 2009.
3. With the aforementioned literature as a guide, RIRRC should conduct a study of the economic feasibility of the potential costs of composting food waste vs. the cost to the generator of landfilling the same waste. RIRRC should seek to assess the practicability of, and all the costs and benefits attendant to, large-scale food waste composting versus the current management practice of landfilling food waste. RIRRC should base its decisions concerning promoting or undertaking large-scale food waste composting on the results of the feasibility study.
4. RIRRC, by June 30, 2008, will complete its investigation of the validity, practicability, cost-effectiveness, and economic and operational feasibility of the application of the IBR technology for converting organic waste into liquid and solid fertilizers.

6-4-9 Materials Recovery Facility

6-4-9-1 Background

Located in Johnston, adjacent to the Landfill, the MRF is owned and operated by RIRRC. It began commercial operation in May of 1989 and during its first 15 years processed more than one million tons of material. Its processing capacity was expanded by 30 percent in 1992. In 1996, the floor space and production capacity were nearly doubled so it could produce up to 140,000 tons of recyclables annually if operated two shifts a day. To maximize the life of its equipment, RIRRC operates the facility for two shifts daily, and in 2004 processed 91,000 tons of material and shipped more than 86,000 tons to market. When

operated 16 hours a day, five days a week, the MRF can produce approximately 34,000 tons of bottles and cans and 93,600 tons of paper annually.

6-4-9-2 Current Status of the MRF

RIRRC spent approximately 2.8 million dollars in FY 2005 to replace old, tired equipment with much faster, state-of-the-industry equipment that will enable the MRF to double its sustained production of mixed recyclables (bottles and cans) from eight tons per hour to a steady-state 16 to 18 tons per hour. This enabled the MRF to achieve its 2004 level of mixed recyclables production in one shift, thus reducing the mixed recyclables operation from two shifts daily to one shift. The new equipment also enabled the MRF to significantly improve its economic efficiency. A complete retrofit of the paper processing equipment, at an estimated cost of \$3 million, is scheduled to be installed in FY 2007.

6-4-9-3 New Management Practices at the MRF

In 2003, the MRF began receiving corrugated cardboard recovered from the CSW stream at the Tipping Facility in steadily increasing amounts, processing about 1,100 tons in 2005. Because cardboard recovered from the CSW stream is much larger than cardboard in the residential waste stream, the cardboard from the Tipping Facility cannot be handled effectively or efficiently by the MRF automated process train and extensive manual handling of the oversized cardboard is necessary.

A report of the MRF's quantities sold for 2004 are contained in Table 171-6-3. MRF revenues for the last three calendar years have ranged from \$4.2m in 2002 to \$7.2m in 2004.

**Table 171-6-3 RIRRC Materials Recovery Facility Quantities Sold
by Category for 2004**

Commodity Class	Tons Sold
Glass	16,736
Milke Cartons/Juice Boxes	155
Mixed Paper	43,283
Newspaper	10,481
Corrugated Cardboard	3,729
Plastic	4,788
Aluminum Foil	21
Aluminum UBC	920
Scrap Metal	413
Tin	3,069
Total Materials Marketed	83,595

6-4-9-4 Findings

After more than 15 years of operation, the MRF remains a reliable supplier of recycled materials and always manages to obtain excellent prices for its recycled materials.

The MRF's technology has proven to be reliable, the machinery durable, and the concept of

blending mechanical and manual separation efficient.

Markets for materials are constantly fluctuating, making it difficult to stabilize the net cost of operating the facility.

Because markets are cyclical and the range of materials that is recyclable includes many low-value materials, the state needs to continue to provide a long-term repository for mixed residential recyclables for Rhode Island's municipalities.

As indicated in 6-3-4, Multi-Family Recycling, the MRF receives and processes residential recyclables recovered from large multi-unit buildings or complexes in quantities that are not known but believed to be insignificant.

As previously reported in Section 6-4-1-3, recovered glass has lost its market value and broken glass has caused damage to the MRF's sorting system. RIRRC retrofitted the MRF with a new processing system for bottles and cans in 2005.

6-4-9-5 Actions

1. With reference to action item 6-3-2, that RIRRC seek to increase the production of recyclables from the Tipping Facility, it is recommended that RIRRC should compare the cost of installing automated cardboard-processing equipment at the Tipping Facility to the cost of retrofitting the MRF's paper processing system to enable it to efficiently and mechanically handle the large pieces of corrugated cardboard being received daily from the Tipping Facility and other commercial sources. This should be completed by January 1, 2008.
2. With reference to action item 6-3-4, that RIRRC consider accepting residential recyclables in the CSW stream tip fee free, it is recommended that the MRF conduct a feasibility study to determine whether processing the residential recyclables in the CSW stream will negatively impact the MRF'S economics or capacity. This should be completed by June 30, 2008.
3. Before retrofitting, modernizing, or replacing the MRF's bottles and cans processing system, RIRRC shall investigate the economic and environmental value and benefits of collecting glass in the municipal program.

6-5 DISPOSAL

6-5-1 Introduction

Although landfilling is the lowest priority for solid waste management, nearly all of the solid waste currently generated in Rhode Island is still disposed of by landfilling, which was the only ~~means of~~ economically viable means of ultimate disposal available to RIRRC in 2005. Waste-to-energy facilities are statutorily prohibited in Rhode Island and, in any case, the cost of implementing the federal New Source Performance Standards make waste-to-energy economically non-viable at this time.

6-5-2 Background

In December 1980, RIRRC purchased, for \$10 million, the Central Landfill with a licensed footprint of 121 acres, to serve Rhode Island's waste disposal needs until an integrated system of solid waste management programs and facilities could be established. As a measure of its importance to the state, it is enough to note that since its acquisition by RIRRC, the Landfill has disposed of more than 85 percent of the municipal and commercial solid waste generated in Rhode Island totaling an estimated 20 million tons.

6-5-3 Current Landfill Disposal Situation

The Tiverton municipal landfill was the only other sanitary landfill in Rhode Island in 2005. Therefore, at the time that this Plan was adopted, 38 of the state's 39 cities and towns disposed of 100 percent of their solid waste at the Landfill.

Since the Landfill disposes of virtually all of Rhode Island's CSW and MSW, arguably the most important solid waste management issues facing the state relate to the facility's disposal capacity and lifespan.

In addition to reducing the amount of waste generated and diverting greater quantities of waste from landfilling, RIRRC has examined a number of capacity management techniques and other means by which to extend the life of the Landfill. RIRRC believes that one of the more effective methods of extending landfill life would be to ship waste to out-of-state disposal. Preliminary research in 2004 indicated that the all-in price of shipping Rhode Island solid waste by rail to landfills out of state would be in the mid-fifty to mid-sixty dollar range. The RIRRC has been analyzing for several years the economics and the potential of utilizing out-of-state disposal as a means of extending landfill life. The Tipping Facility, a transfer station with 57,500 square feet of operating space, was designed to be able to facilitate out-of-state shipment of waste if and when necessary. It is reasonable to expect that by 2008, and perhaps earlier, prices for disposing of CSW at the Central Landfill will be set to be approximately equivalent to the total cost of disposing of solid waste out of state.

6-5-3-1 The Current Role of Landfilling as the State's Sole Disposal Option

In 1996, approximately 776,000 tons of municipal and commercial solid waste were disposed of at the Landfill. In 2005, approximately 1,170,000 tons of solid waste were disposed of at Central. This increase is largely the result of the increase in the disposal of CSW that had previously been disposed of at Massachusetts facilities that closed during this period of time or that raised their disposal fees, driving the Rhode Island waste to the lower-priced Landfill. Also contributing to this increase in the level of disposal was the addition of five municipalities to the Landfill's service area that had previously not used the Landfill for solid waste disposal. Another important contributing factor is the increase in the waste generation rate that has been observed nationally as well as in Rhode Island.

The Landfill has been the lynchpin of the Rhode Island system for years and it is apparent that it will continue in this role through at least the first two decades of the 21st Century. Important objectives of RIRRC, as expressed in this Plan, are the reduction of Rhode Island's dependence on landfilling and the extension of the useful life of the Landfill for as long as

possible.

6-5-3-2 Brief Description of the State Landfill

The Landfill is located on a parcel of about 1,100 acres on Shun Pike in western Johnston. For the first 20 years of RIRRC ownership, disposal operations were confined to the 154 acres that were permitted as a sanitary landfill at the time it was purchased by RIRRC in 1980. In 2005, the landfill footprint totaled 199 acres with the original 154 acres of Phases I, II, and III either permanently or temporarily closed. Active landfill operations in 2004 were conducted on the 45-acre Phase IV and 32-acre Phase V landfills.

The active portions of the Landfill have been equipped with double geo-membrane and clay liners with leachate collection systems since 1993 in order to protect groundwater from landfill leachate; all new landfill expansion areas since then have been equipped with base liners and leachate collection systems, which, as of 2005, had been installed on 102 acres of the facility's footprint. For its first six years of operation the leachate collected by the system was treated in a temporary treatment facility and discharged to the Cranston sewer system via a pump station and sewer force main built, owned, and operated by RIRRC. In 1999, a permanent, sophisticated leachate treatment facility was brought on-line and by 2005 it was processing approximately 200,000 gallons of landfill leachate daily. A number of improvements to the facility were installed in FY 2005, increasing its capacity to 400,000 gallons per day.

In 1987, in order to control the odors caused by gas escaping from the Landfill, a landfill-gas collection and destruction/reuse system was installed. primarily to control the foul odors carried by the increasing amounts of gas escaping from the Landfill, but This system was designed not only to control odor but also to burn the methane contained in landfill gas to generate electricity. ~~In-By~~ 2005, the system consisted of 200 vertical production wells, 85 horizontal trenches, and more than 15 miles of lateral collection pipes that traverse the entire interior of the facility. More than 90 percent of the approximately 10,000 cubic feet per minute of gas produced by the Landfill is burned in the landfill gas electric generating station located at the base of the eastern slope of the Landfill, producing more than 14 megawatts of power. Most of the remaining gas was flared. Sale of the electric energy to the Narragansett Electric grid generated about \$1.2 million ~~annually~~ for RIRRC in 2005. A second electric generating station ~~that was installed~~ near the southwest corner of the Landfill ~~in 2005 and is scheduled to go into~~ began operation in September 2005. Producing 6 megawatts, it increased the total electric power production ~~of this system~~ to more than 20 megawatts with total annual revenues ~~s~~ estimated at approximately \$2 million.

The leachate collection/pre-treatment systems and the landfill gas collection and destruction/reuse systems are among the most extensive and sophisticated facilities and systems that have been installed to protect the environment from landfill impacts. To complement and supplement the groundwater protection provided by the base liners and leachate collection systems, composite clay and geo-membrane caps have been installed on those portions of the Landfill that are permanently closed in order to prevent rainwater from seeping down into the Landfill and through the buried trash. As of 2005, final caps have been installed over approximately 120 acres of the Landfill.

In order to protect Cedar Swamp Brook and Simmons Upper Reservoir from sediments carried by surface runoff water, nine sedimentation settlement ponds have been built at an estimated cost of more than \$7 million to serve the entire Central Landfill Operations area.

Phases IV and V of the Landfill required the relocation of Cedar Swamp Brook with complete retention of the stream's riparian integrity at a cost of more than \$10 million.

The geologic, geophysical, hydraulic, and other geotechnical subsurface investigations completed under the auspices of the EPA and the DEM in connection with the Landfill's designation as a Superfund site and the remedial activities ordered as a result cost approximately \$20 million.

In summary, a total of more than \$100 million has been spent on the various environmental protection and remediation activities and programs necessitated by the operation of the Landfill over the past 25 years.

In the seven years prior to the publication of the initial Plan in 1996, the Landfill disposed of an average of approximately 700,000 tons of solid waste annually with disposal tonnages of about 787,000 tons in 1995 and 776,000 tons in 1996. The 1996 Plan projected that, with recycling expected to increase steadily on an annual basis, with the sources of commercial solid waste known and stable, and with the level of commercial solid waste generation and disposal expected to remain approximately constant, the Landfill would load approximately 750,000 tons annually and landfill life projections were calculated on the basis of disposing of 750,000 tons annually.

However, the solid waste disposal situation underwent a number of remarkable changes between 1996 and 1998, changes that very quickly invalidated the landfill life projections made in the 1996 Plan. Most importantly, the commercial waste generated in Rhode Island that had been disposed of in Massachusetts for the previous eight years, began flowing into the Landfill for the reasons discussed in this Part 6 above and in Part 5. How significant was this sudden influx of CSW beginning in 1996? Analysis of historical CSW disposal figures at the Landfill and of the commercial solid waste collection industry indicate that between 1988 and 1997 from 40 to 60 percent of CSW generated in Rhode Island had been disposed of at Massachusetts facilities depending on the year. In the seven years immediately prior to 1996, 2,322,000 tons of CSW were disposed of at the Landfill while in the seven years from 1996 to 2002 inclusively, 3,942,000 tons of CSW were tipped at the Landfill. Historical data indicate that approximately 900,000 tons of CSW are generated annually in Rhode Island with about 600,000 tons delivered to ultimate disposal annually. In other words, 42 percent of the state's CSW was disposed of in Massachusetts from 1988 through 1995. To put this in a different perspective, since 1996 the Landfill has disposed of about 250,000 tons of CSW per year more than in the seven-year period prior to 1996.

Secondly, the levels of recycling that had been anticipated in the 1996 Plan were not realized, in part because of the reasons discussed in the waste prevention and recycling sections of this Part 6. As a result, in the five years preceding 2005, the Central Landfill loaded an average of about 1,075,000 tons annually. As indicated in the discussion in Part 5, with Central Landfill's maximum wasteshed now clearly established and with all solid waste from within

that wasteshed expected to be disposed of at Central Landfill for the foreseeable future, it can be projected that the Landfill will dispose of an annual average of 1,348,190 tons through 2025, beginning with about 1,186,526 tons in 2005 and gradually rising annually thereafter *unless there is no additional waste reduction or recycling beyond the levels achieved as of 2005*.

On the other hand, if the major actions described in this Plan to divert commercial and municipal waste from landfilling are fulfilled, the Landfill load will decline to a projected annual average of 937,029 tons in 2025. The load decreases sharply until 2010 when the projected increases in population and per-capita waste generation overtake the diversion from disposal.

Under the status quo scenario, it is projected that a total of 25,483,452 tons of solid waste will have to be disposed of through the year 2025. Under the aggressive recycling scenario, it is projected that a total of 18,576,423 tons of solid waste will have to be disposed of over that timeframe. This equates to about 7 years of additional disposal over the projected life of the landfill under the aggressive recycling scenario.

6-5-3-3 The Southwest Landfill (Phase IV)

The Phase IV Landfill was opened September 2000 and has a final footprint of approximately 44 acres divided into four sections. The landfill loading rate was projected to be in excess of 750,000 tons per year in the 1996 Plan. At the time this Plan was adopted, Phase IV was filling at approximately 1.1 million tons per year and is near full capacity.⁸

6-5-3-4 The Phase V Landfill

The Phase V Landfill received its final regulatory approval in July 2004. The final design for this Phase is consistent with the June 24, 1993 *Interim Rhode Island Comprehensive Solid Waste Management Plan: Landfill Siting*, Statewide Planning Report No. 78, (the Interim Plan) and the 1996 Plan and as certified by the SPC on June 28, 1993.

The Phase V Landfill has a footprint of approximately 32 acres in a piggy-back configuration over Phases I and IV. It is located largely within Generic Landfill Sites CNW and CSW, as identified in the Interim Plan, which have been previously certified by the SPC.

Phase V has an estimated life as long as 6.2 years assuming aggressive waste diversion or as little as 5 years under the current diversion rates.

6-5-3-5 Future Capacity - Landfill Siting

Given the projections presented in Part 5, the life of Phase V could be as little as 2011 or as long as 2012. As indicated elsewhere in this Plan, the state will have a continued reliance on

⁸ As with the earlier landfill phases it can be expected that additional airspace will become available prior to final capping in Phase IV due to settling. Because of the uncertainty in estimating this additional capacity it has not been factored into the landfill capacity projections.

landfilling as a means of final solid waste disposal well beyond such time. Therefore, additional landfill capacity will need to be sited.

RIRRC financed the Statewide Landfill Siting Project and report in 1989-90 that screened the entire state for potential landfill sites. Using elaborate screening and evaluation processes, the project compared potential sites with the systematic and methodical elimination of potential sites based on factors of location, geography, geology, and other environmental resources. Additionally, sites were graded and ranked using a model that evaluated economic and social impacts of a landfill.⁹ This report and its conclusions are the basis of landfill siting approvals of the last two phases of the Landfill and remains valid today.

Consistent with the conclusions of the prior landfill siting, suitable locations for landfill sites exist within RIRRC's current land holdings. Furthermore, these areas are contiguous to the existing landfill, making them the optimal locations for future landfill sites.

Since the 1996 Plan was approved, a number of other factors have become significant for purposes of future expansion at the Landfill. RIRRC has invested millions of dollars in additional infrastructure.

A separate set of ramps has been constructed at Route I-295 and Scituate Avenue in Johnston to provide improved quick access to RIRRC's facilities and the proposed industrial park. Moreover, RIRRC widened Shun Pike from two to four lanes in 2004 to provide an arterial grade highway from I-295 to the agency's main entrance. Additionally, RIRRC upgraded the leachate pretreatment plant in 2005 to increase its capacity and efficiency at an estimated cost of \$2 to \$3 million.

Furthermore, the environmental investigations conducted under the EPA oversight pertaining to the environmental remediation of the Landfill Superfund site have been completed and indicate that movement of the hazardous waste contamination in the ground water under the Superfund site does not extend beyond the RIRRC property boundaries, subsurface conditions in the area east of the Landfill Phase I have been stabilized, and no environmental remediation work in addition to that already undertaken by RIRRC is necessary beyond the boundaries of the Phase I Landfill. The general location of the plume of contaminated ground water from the Landfill is coincident with the proposed area for future landfill expansion. As a land use decision, it is well founded to locate an additional landfill site above the areas where the groundwater is already most impacted.

Experience with the design and construction of Phase IV has determined that an "overlap" configuration which minimizes the footprint of the Landfill on previously unfilled areas is most efficient in maximizing landfill space and minimizing impacts on previously unfilled areas. Additionally, the EPA has approved landfilling in this manner above the areas of the permanent landfill cap that was installed at EPA's direction over the Superfund site.

⁹ Landfill Siting Project, University of Rhode Island Department of Resource Economics – Wessells, Opaluch, Swallow, Weaver and Wichelns (1989).

6-5-3-6 Proposed Phase VI Landfill

The highest priority issue with respect to the timely availability of future landfill capacity is that a landfill cell be designed and constructed in a piggyback fashion east of the existing Phase I, shown below in Figure 171-6-1 as the areas labeled Proposed Phase VI-A and Proposed Phase VI-C. In addition, the viability of a vertical landfill expansion beginning at the plateau level of the existing Phases I, II, III, IV, V and proposed Phase VI-A landfill cells is also being assessed. This vertical expansion is shown in the figure as the area labeled Proposed Phase VI-B.

Based on experience with Phases IV and V of the landfill, immediate full build-out to the proposed Phase VI footprint is not practicable due to engineering constraints and requirements to contain leachate. Cell construction is proposed for staged implementation to maximize use of the Phase VI footprint and to maximize the useful life of several operations facilities located east of the current landfill area.

Existing RIRCC facilities requiring relocation

Prior to construction of Phase VI-A, Detention Pond 3 would be removed and existing ponds would be expanded or new ponds constructed to accommodate drainage area discharges. The conceptual layout for the proposed Phase VI landfill, shown in Figure 171-6-1, delineates approximately 18 acres of area for future storm water detention ponds. Models based on this conceptual design indicate that the delineation of 18 acres of area to provide additional stormwater controls for the future Phase VI expansion is more than adequate. Furthermore, if during the final permit design stage, should additional storage be determined necessary for storm water control, there is ample space available east of the proposed expansion for this purpose. In addition, the landfill gas power plant operated by Ridgewood Power Company would require relocation.

If a vertical expansion is approved, Phase VI-B construction would take place next. Finally, expansion to Phase VI-C would take place, which will require relocation of the Tipping Facility, Recovermat Facility, access road, and circumferential roadway. The existing administration building would also require relocation.

The cost of relocating existing facilities in the event of eastern expansion of the landfill is estimated as follows:

<u>power plant</u>	<u>\$10M (very rough estimate)</u>
<u>tipping facility</u>	<u>\$14M (based on cost of the existing facility)</u>
<u>Recovermat facility</u>	<u>\$2.3M (based on the cost of the existing facility - not including equipment)</u>
<u>administration building</u>	<u>\$12M (rough estimate based on existing facility cost)</u>

The Phase VI footprint is proposed for up to a 98-acre expansion to the east of the landfill. Total use of the entire Phase VI footprint without the vertical expansion will enable the RIRCC to meet projected landfill requirements for approximately 9.5 to 12.5 years with a

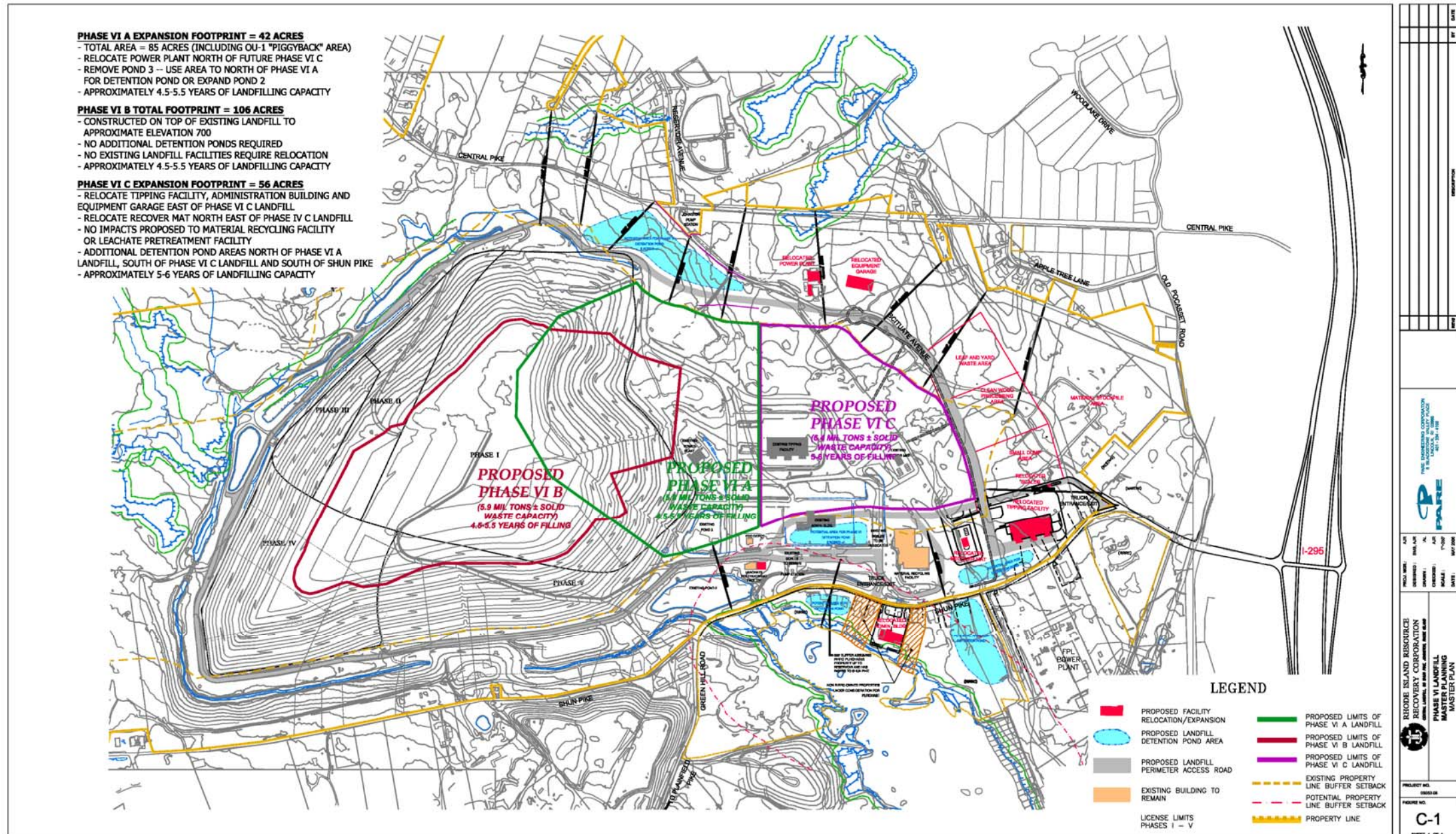
total estimated capacity of 12.2 million tons. Given approval of the proposed Phase VI-B vertical expansion, an additional 5.9 million tons of capacity, or 4.5 to 5.5 years would become available.

Design of cells within the Phase VI Landfill will be subject to licensing review, permitting, and approval of the state level. This document addresses siting location only for the expansion of the Phase VI Landfill east of current landfill operations and above the existing landfill cells.

The siting and permitting process for this Phase VI landfill expansion(s) will commence with the adoption of this Plan. The design and permitting process will begin with expectations for base liner construction in 2009 in order to ensure that a fully-lined facility is ready to receive trash when the capacity of the Phase V Landfill is exhausted. RIRRC believes that there is a reasonable expectation, based on its best scientific and engineering estimates, that its application to permit and license the Phase VI Landfill will be successful on technical grounds.

RIRRC believes that the current Host Community Agreement ratified in April 1996 by the Town does not prohibit landfill expansion to the east.

Figure 171-6-1 Proposed Phase VI Landfill Siting



6-5-4 Storm Water Drainage Control

The Resource Recovery Corporation property falls within a subwatershed of the Pocasset River. The Pocasset River has flooding problems and has been the subject of a Natural Resource Conservation Service (NRCS) flood study that resulted in a flood model and suggested remediations for the study area. Although the RIRRC has not been identified as a major contributor to the flooding of the Pocasset River, the Corporation implemented storm water controls to contain not only the peak flow rate, but also the increased volume from storm water runoff for the 2, 10, 25, and 100-year storm events.

In addition to avoiding flooding offsite, the Corporation is faced with two other important goals in managing storm water on the Landfill, namely, avoid infiltration of storm water into disposal sites and avoid impacts to onsite wetland areas. The Corporation believes it can meet these three goals through the delineation of approximately 18 acres of area for future stormwater detention ponds. The detention ponds are designed as wet ponds and will provide not only extended stormwater detention, but will also be used for sedimentation purposes. Ponds are typically six to eight feet in depth and maintain a two to three foot sediment pool.

The Corporation is committed to ensure that the future Phase VI Landfill expansion does not contribute to the flooding problems in the Pocasset and believes that the delineation of 18 acres to provide additional stormwater control is more than adequate. At present, the peak attenuated flow rate discharging into the Upper Simmons Reservoir from the facility during the 100-yr event is 991.5 cfs. Applying the conceptual Phase VI design to the facility's existing stormwater model and utilizing a conceptual detention pond size totaling 13 acres (minimum), results in the complete onsite attenuation of the increased volume as well as a conceptual reduction in the peak flow rate to approximately 875 cfs for the 100-year storm event. Should additional storage be needed for stormwater control, there is ample space available in the proposed expansion area for this purpose. The previously mentioned NRCS flood model for the Pocasset River would serve as the basis for evaluating storm water impact.

6-5-5 Projected Landfill Life

For the purposes of long-term, total systems planning, Landfill life projections assume: 1) ~~solid waste disposal capacity calculations allow~~ 20 percent of total landfill capacity for cover material; 2) landfill average density of 1,300 pounds per cubic yard; 3) solid waste landfill loading rates as derived in Table 171-~~6-4 of the prior section~~below.

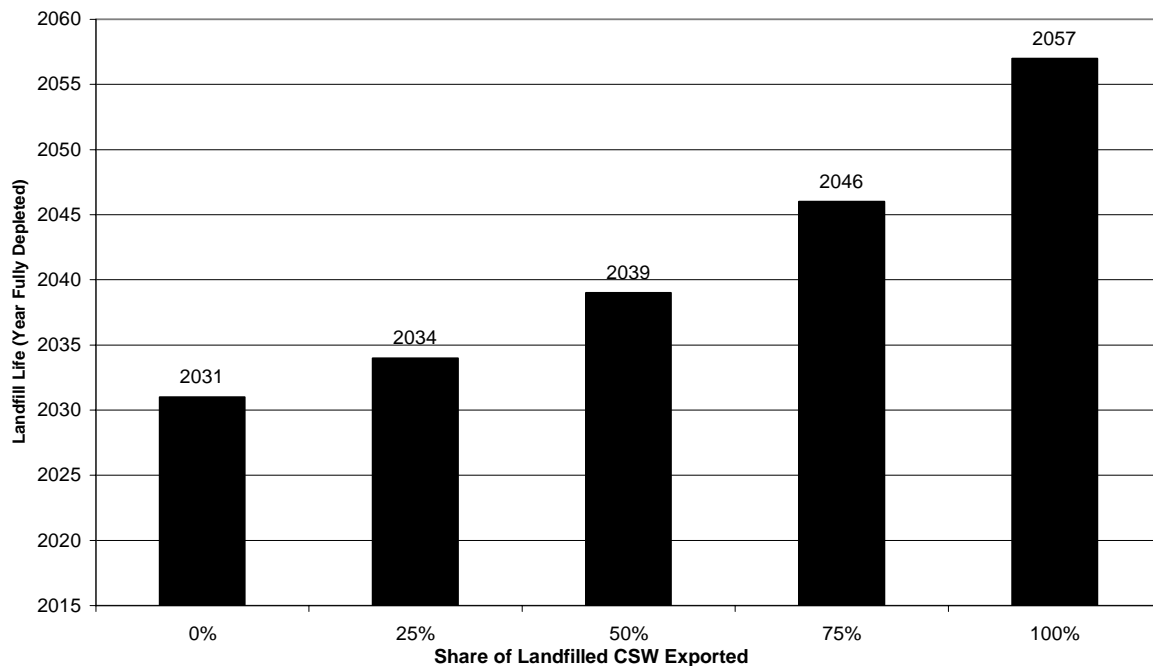
Table 171-6-4 Projected Landfill Capacity and Utilization

	Capacity Remaining 12/31/05 (Tons)	Cumulative Capacity (Tons)	Expected Life Status Quo	Expected Life with Increased Diversion
Phase V	6,249,766	6,249,766	January 2011	May 2012
Phase VI-A	5,800,000	12,049,766	August 2015	November 2018
Phase VI-B*	5,900,000	17,949,766	March 2020	March 2025
Phase VI-C	6,400,000	24,349,766	January 2025	January 2032

* Vertical expansion contingent upon EPA approval.

An alternate scenario that has the potential to significantly increase Landfill life is to change assumption 3 (landfill loading rates). The simplest mechanism to reduce the amount of waste disposed at the Central Landfill is to raise the commercial solid waste tip fee to a point where a significant share of Rhode Island's commercial sector waste is either reduced and diverted to recycling by generators, or as is more likely, exported to out-of-state disposal facilities by private haulers. Given the dwindling supply of disposal capacity in New England, the most likely destination for the bulk of Rhode Island waste exports would be southeast and mid-western states. Under such a scenario, the life of the Landfill could be extended by as much as an additional 25 years, to 2057 (Figure 171-6-2.) It is important to note that such a reduction in commercial waste would significantly affect RIRRC operating revenue. See section 8-2-6 Financing the System for further details.

Figure 171-6-2 Projected Landfill Life Under CSW Exportation Scenario



*These estimates assume that the recommendations of this Plan and the corresponding diversion goals are achieved.

6-5-6 Capacity Enhancing Technologies

Since 1996, the RIRRC has conducted several pilot projects to test methods of improving the compaction of the landfilled waste and thereby expanding capacity through more efficient utilization of available airspace. This included a pilot project to determine if the compaction of landfilled waste could be improved by methodically pounding it with an enormous weight lifted and dropped by a crane. Other examples of capacity enhancing technologies include the following:

- **Solid Waste Bioreactors**

Bioreactor landfills, which are designed and operated to rapidly transform and degrade organic wastes through the controlled injection of liquid and air into the landfill to enhance microbiological activity within the landfill, are one of the emerging technologies being developed for the purpose of hastening decomposition and expanding landfill capacity. There are three different types of bioreactors: 1) aerobic reactors in which leachate is removed from the bottom of the landfill and re-circulated through the facility while also injecting air; 2) anaerobic reactors in which leachate or other moisture sources are circulated through the waste to stimulate anaerobic decomposition. This method of decomposition produces excess amounts of landfill gas, primarily methane, which can be recovered through a methane extraction system to generate energy and reduce greenhouse gas emissions; and 3) hybrid reactors which utilize both aerobic and anaerobic decomposition techniques. There are a number of cost and environmental advantages and disadvantages involved with bioreactors and their technologies. The various implications would have to be diligently investigated before a decision is made to go forward with developing a bioreactor. However, the advantages of increased density of waste and attendant increased capacity availability, increased methane available for electric power generation and reduced post-closure costs and care could be significant. Development of a bioreactor landfill will require regulatory enablement.

▪ **Landfill Covers Alternative to Earthen Materials**

RIRRC utilizes a variety of earthen materials or crushed aggregate, including glass cullet from the MRF, as daily cover over the landfilled solid waste. A full 20 percent of the total capacity of a typical sanitary landfill is consumed by cover materials. RIRRC has done an excellent job of replacing virgin materials for landfill cover. Processed C&D, processed oil-contaminated soils, screened street sweepings, sludge incinerator ash, tire incinerator ash-residue, certain dredge spoils, and many other types of materials that would otherwise have been disposed of are utilized by the RIRRC as landfill cover materials. Nevertheless, these types of cover materials take up to 20 percent of available capacity in the landfill. The use of tarpaulins and various types of geo-textiles as alternative landfill covers is becoming increasingly widespread at other facilities.

6-5-7 Future Disposal Technologies

While the possibility exists to expand the footprint of the current landfill even beyond the proposed Phase VI site, the total available space for landfill disposal at this site, and in fact, in Rhode Island, is finite. Therefore, the planners of the future will need to consider options that do not include a Rhode Island landfill for disposing of the state's solid waste. While the exportation of solid waste from the state is a likely alternative, transportation costs and uncertainties associated with out of state disposal markets make it less desirable. As new technologies emerge for converting waste to energy, technologies that would not pose the unacceptable environmental risks associated with traditional mass burn technologies, they should be evaluated as possible alternatives for disposal.

6-5-8 Findings

~~Reliance upon the uncertainties of out of state landfill or incinerator capacity markets for the disposal of large quantities of waste would be risky, with respect to both pricing and availability. If waste were shipped out of state for disposal, a balance between simultaneous~~

~~utilization of the Landfill and out of state disposal would best serve the state from a pricing and capacity availability perspective. The percentage of the waste stream that RIRRC should consider for shipment out of state would be a function of the level of risk RIRRC would be prepared to assume. Diversion of significant amounts of commercial waste would have obvious benefits in terms of extending landfill life for municipal waste. However, there are risks that need to be evaluated as well. The state has no control over future costs of out of state disposal or shipping costs. Even if those costs are currently only slightly higher than current in-state disposal rates, there is no guarantee that this will always be the case. The financial implications of substantial waste diversion need to be carefully analyzed to determine the impact of such alternatives in corporation operations and budgets at the state and local levels.~~

While “flow control” measures to limit out-of-state waste importation of solid waste have been found to be in conflict with the Commerce Clause of the U.S. Constitution, many of the big waste importing states still seek to implement such measures and also discourage waste importation through regulatory fees and surcharges rationally related to a public purpose. Therefore, it is prudent planning for Rhode Island to be self-sufficient regarding solid waste management and to continue to develop its own facilities for the long-term recycling and disposal of the solid waste that its people and businesses generate.

The least controversial and most environmentally acceptable method of creating landfill disposal capacity adequate to serve Rhode Island is by waste prevention, recycling, and composting. RIRRC and the DEM are committed to achieving these objectives and this commitment is reflected in this Plan.

With the licensing of the Phase VI Landfill and with the implementation of an aggressive waste diversion program as described elsewhere in this part, approximately 15.5 years of disposal life can be expected at the Landfill at an average loading rate of approximately 1,000,000 tons of solid waste per year. This disposal life can be substantially lengthened if the state can reduce the anticipated annual tonnage through greater efforts in waste prevention, recycling, and diversion.

Major portions of the four best 400-acre Generic Landfill Sites in the state, as identified in the URI siting study, are situated on RIRRC’S approximately 1,100 acres of land in Johnston.

6-5-9 Actions

1. RIRRC will proceed as expeditiously as possible with the permitting process for the proposed Phase VI of the Landfill to ensure that licensed capacity is available when needed.
2. RIRRC and the DEM should implement the aggressive commercial and municipal waste prevention and recycling programs required for the maximum conservation of landfill capacity.
3. RIRRC should continue its program of conducting experiments and pilot programs to test the feasibility and efficacy of improving the utilization of available airspace in

the Landfill. In particular, RIRRC should investigate the advantages of developing the Landfill into a bioreactor landfill. RIRRC should also explore the utilization of a tarpaulin or some sort of geo-membrane as an alternate landfill cover. In general, RIRRC should always seek to employ the best available landfill operating technologies.

4. RIRRC will research alternative scenarios to extend disposal life at the Landfill through methods described above and through diversion of the commercial waste stream.

171-7 MANAGEMENT OF SPECIAL WASTES

7-1 INTRODUCTION

This part of the plan discusses special wastes and sets out programs and strategies for certain components of this waste stream, including white goods, scrap metal, tires, demolition/construction waste, sludge, septage, agricultural waste, household batteries, used oil collection and management, household hazardous waste, electronics, and mattresses.

7-2 TIRES

7-2-1 Introduction

It is estimated that nearly 1 million tire discards are generated in Rhode Island each year. A small percentage of truck tires are re-treaded and resold, some are re-used in a wide variety of applications ranging from building artificial reefs to making doormats and sandals, and an increasing number are shredded or chipped for use in construction projects. However, by far the majority of worn tires generated in Rhode Island in 2005 were burned in the tires-to-energy plant in Sterling, Connecticut. Tires present unique waste management handling problems in both their collection and disposal.

7-2-2 Current Management Practices

There are no licensed tire recycling facilities in Rhode Island, and RIGL §23-63-2 enables only RIRRC to establish or designate tire disposal facilities within the state.

All of the illegal waste tire piles in Rhode Island have been cleaned-up by the DEM and the RIRRC. RIRRC provided financial and worker assistance in cleaning up illegal tire piles in Olneyville and on Belfield Road in Johnston. The clean-up of Rhode Island's largest, most notorious tire pile, at the Davis Landfill in Smithfield, which had several million tires, was completed by the DEM in the late 1990s.

A 1993 federal statute that required that tires pulverized into powder be utilized for batching asphalt for road building was never implemented. Nevertheless, approximately five percent of all tires generated in the United States are ground into "crumb rubber" and used to make asphalt for roads, mostly in the far west and southwest. Tire shreds are increasingly being utilized for civil engineering applications such as highway embankments, roadbed subgrades and backfills, bridge abutment subgrades, landfill liner and drainage systems, and septic drainage fields. About 20 percent of scrap tires are recovered for resale as used tires overseas or are re-treaded. However, the most common method of dealing with waste tires is combustion. More than 40 percent of the waste tires generated in the nation are used as fuel in electric generating stations, pulp and paper mills, the cement industry, industrial boilers, and others.

The largest consumer of waste tires in New England is the tire incinerator in Sterling, Connecticut operated by Exeter Energy, Inc., which burns 10-11 million waste tires annually

and is the largest dedicated tire-burning facility in the United States. For the past five years, the RIRRC has received an annual average of approximately 2,000 tons of waste tires, which is approximately 20 percent of the total number of waste tires generated annually within Rhode Island. Rhode Islanders generate about one waste tire per capita per year. The waste tires generated in Rhode Island that are not delivered to Central Landfill are either recapped locally or are collected by one of the regional firms that specialize in the recovery of waste tires -- Bob's Tire Co., Mainline Tire Co., M&M Tire Co., and F&B Tires, all of New Bedford, MA; Meridian, Inc. of Plainfield, CT; Inter-East Tires, Inc. of West Haven, CT; and Routhier & Sons, Inc. of Ayer, MA -- and are hauled to tire processing facilities in Connecticut and Massachusetts.

Under an arrangement that has been in place for the past ten years, Exeter Energy accepts all of the tires received by the RIRRC at no disposal fee. In return, RIRRC accepts all of the ash-residue generated by the tire incinerator and beneficially re-uses it as landfill daily cover material.

The RIRRC has, from time to time, explored the feasibility of developing or assisting in the development of waste tire processing facilities of various types. None of the projects investigated by the RIRRC in the past proved to be as economically advantageous to the corporation as its arrangement with Exeter Energy.

7-2-3 Findings

There is no tire processing capacity within the state, although the plentiful tire processing and disposal capacity that exists in nearby Massachusetts and Connecticut can be used.

7-2-4 Actions

1. DEM will continue to monitor the scrap tire market very carefully to ensure that the waste tires being generated continue to move to tire management facilities that have received environmental permits for waste tire storage or tire recycling.
2. RIRRC will explore the regulatory and economic feasibility and practicability of landfill-related applications for chipped tires by June 30, 2008.
3. The RIRRC will continue to explore opportunities with the private sector to determine if an end-market tire recycling operation at an RIRRC facility is economically viable.
4. The RIRRC will monitor the waste tire disposal market regularly to ensure that there are always disposal options available for the waste tires it receives in Johnston in the event current disposal arrangements collapse.
5. The RIRRC and the DEM should continue to work with agencies in the other Northeast states through the Northeast Waste Management Officials Association to coordinate regional legislation and recycling options to ensure that beneficial reuse becomes the norm not only for "fresh" used tires but also for the piles that exist throughout the region.

7-3 WHITE GOODS AND SCRAP METAL

7-3-1 Nature of the Material

White goods are large appliances, primarily composed of ferrous metal, primarily found in the municipal waste stream. They include stoves, ovens, refrigerators, washers, dryers, etc. White goods are often collected, recycled, or disposed of mixed with other bulky materials, such as scrap metal, which in the municipal (non-demolition) solid waste stream, includes cabinets, lockers, ductwork, tire rims, bicycles, mattress frames, etc.

7-3-2 Current Management Practices

It has always been the policy of the RIRRC to keep white goods out of the Landfill because of the disproportionate amount of capacity they would consume and because there has always been a favorable scrap metal market. To that end, RIRRC receives white goods (200-250 tons annually, mostly from municipalities) at its commercial recycling area. Freon is removed, if applicable, and the appliances are then sold as scrap metal.

7-3-3 Findings

Rhode Island has an excellent processing and export (rail, port, road) infrastructure for the recycling of white goods and scrap metal and has landfill capacity for the disposal of process residue.

The Port of Providence is well suited for the processing and export of scrap metals. One major scrap metal business is active at this location. A second has closed its operation due to regulatory problems.

7-3-4 Actions

1. Continue current management practices.

7-4 CONSTRUCTION WASTE AND DEMOLITION DEBRIS

7-4-1 Introduction

While C&D is defined Rhode Island law as a solid waste, most C&D in 2005 was not disposed of in Central Landfill as solid waste. At the time that this Plan was adopted, most C&D generated in Rhode Island was processed and utilized by RIRRC as an alternative daily landfill cover material. In fact, C&D volumetrically represents the largest single type of alternative cover material among the several different types used at Central Landfill.

It is estimated that C&D constitutes up to 20 percent of the CSW, a figure that was virtually impossible to determine with any accuracy prior to 1995 when C&D was logged over the scales as CSW for disposal. At the time, it was just part of the CSW stream. Then in 1995, RIRRC began to utilize the screenings from C&D grinding operations as an alternative cover material. The use of C&D screenings as an alternate cover material very quickly led to the grinding of C&D into particles small enough to qualify as an alternative landfill cover material. It wasn't long before C&D itself, rather than just C&D screenings, was being

processed and used for landfill cover material. RIRRC recognized that it was possible to back out the use of virgin earthen materials as landfill covers by utilizing processed C&D, generating nearly as much revenue as if the material were being disposed of as a solid waste while not using up disposal capacity. RIRRC purchased the solid waste transfer station on Plainfield Pike in Cranston, which had a 400 TPD permit, and set up a C&D sorting and grinding operation there. At the time this Plan was adopted, the agency charged its commercial contract customers \$41.00/ton to tip C&D at the transfer station. RIRRC was avoiding the cost of purchasing virgin materials while earning a tip fee and beneficially reusing a waste material for cover.

By 2005, RIRRC was using nearly 280,000 tons of processed C&D annually for alternate daily landfill cover. Against total CSW annual generation of more than 900,000 tons, this C&D stream accounted for roughly 20 percent of the total.

RIRRC moved its C&D processing facility from the Plainfield Pike transfer station to a new facility on its main property north of the MRF and east of the Tipping Facility.

DEM has the authority to license and regulate the siting, construction, and operation of C&D processing facilities.

7-4-2 Findings

Landfills are excellent markets for C&D materials. An operating landfill with inadequate cover material or a landfill in the closure and landscaping phase can be a major market for processed construction/demolition products (high volume uses for rubble, fines, and wood chips). A landfill site typically has sufficient outdoor space to locate processing equipment, waste storage areas, and product storage areas.

The quantity of C&D waste generated in Rhode Island represents a significant portion of the total amount of all types of solid waste generated. Increasing the recycling of C&D waste reduces the total amount of solid waste in the state that must be landfilled or disposed of in other ways.

Many of the materials recovered and processed from C&D waste can be used in new construction projects, and are a cost-effective alternative to virgin materials.

Asphalt pavement removed during road reconstruction or repaving projects can be used as a source of aggregate and asphalt in new pavement.

Concrete removed from demolished structures and bridges can be crushed into aggregate for use in new concrete, or can be used as a base material for roads and new structures.

Clean wood waste generated during the construction, renovation, and demolition of buildings can be processed and sold for landscaping mulch, animal bedding, fuel, and other uses.

C&D waste recycling is a rapidly growing industry involving numerous private companies that collect, separate, process, and recycle C&D waste. Examples of the type of firms that benefit from C&D waste recycling are architects and designers, builders, road construction

companies, and paper mills.

Recyclable materials such as clean wood, metal, and corrugated cardboard are included in the CSW that is delivered to the Tipping Facility.

7-4-3 Actions

1. RIRRC will operate the C&D processing facility it brought on-line at its Johnston complex in 2005 to recover as much material from the C&D stream as possible for sale to re-use markets before the C&D is processed for use as alternate landfill cover.
2. As part of its effort to recover more recyclables from the CSW stream at the Tipping Facility, RIRRC will seek to maximize recovery of C&D materials.
3. Beginning June 30, 2007, the DEM and RIRRC will work with local officials who issue demolition permits to integrate reduction/recycling objectives into the building demolition permit process.

7-5 SEWAGE TREATMENT FACILITY SLUDGE AND SEPTAGE

DEM's regulations define sludge as a residue, partially solid or solid, treated or untreated, resulting from the treatment of sewage, including such residues from the cleaning of sewers, by processes, such as settling, floatation, filtration, and centrifugation, and shall not meet the criteria for a hazardous waste as found in DEM's Hazardous Waste rules and regulations.

Septage is any solid, liquid, or semi-solid removed from septic tanks, cesspools, privies, domestic wastewater holding tanks, or other individual sewage disposal system (ISDS). It is composed of concentrated, water-borne materials that have undergone varying degrees of anaerobic decomposition, and is characterized by large quantities of solids, grit, and grease, and offensive odors. It also contains pathogenic organisms, which can leach from malfunctioning septic systems and contaminate ground and surface water. Septage does not enter the solid waste stream unless it is treated in a wastewater treatment facility, the resulting sludge is landfilled, composted, or burned in a sludge incinerator, and the resulting ash landfilled.

Prior to 1988, wastewater treatment plant sludge constituted more than 100,000 tons of the approximately one million tons of solid waste disposed of annually at the Landfill. A DEM consent order in 1988 resulted in a 90-95 percent decrease from annual sludge loadings. By 2005, less than 10,000 tons of sludge was disposed of annually at Central. While RIRRC was extensively involved during the 1980s and early 1990s in sponsoring sludge management pilot programs and the development of innovative, environmentally friendly sludge management practices, a Rhode Island Superior Court decision in 1995 determined that sewage sludge is not a solid waste and that facilities that manage sewage sludge are not solid waste management facilities.

Based upon the February 1995 Superior Court decision, this Comprehensive Plan will not address the management of sewage sludge.

7-6 MOTOR VEHICLE BATTERIES

7-6-1 Introduction

It has been recognized that motor vehicle batteries may be difficult for vehicle owners to dispose of, and pose health, safety, and environmental concerns if improperly disposed of.

7-6-2 State Regulations

In 1987, a statute was enacted requiring a deposit of \$5.00 upon purchase of a new car battery, \$4.00 of which would be sent to DEM. Payment would be waived if the consumer turned in a used battery with the purchase. The funds would be used by the DEM for battery management programs, including licensing battery recyclers. In 2000, the \$5.00 deposit requirement and DEM's authority to license battery recyclers were repealed.

7-6-3 Current Management Practices

Because of the value of the recycled lead in motor vehicle batteries, they can normally be disposed of through battery dealers or recyclers by vehicle owners at little or no cost to them.

7-7 USED OIL AND OIL FILTER MANAGEMENT

7-7-1 Introduction

Used oil means a petroleum-based oil that, through use, storage, or handling, has become unsuitable for its original purpose. This section applies to used motor oil and automotive oil filters.

Most of the motor oil sold to consumers in the United States is purchased by individuals who change the vehicle oil themselves. Unfortunately, significant amounts of used motor oil are discarded in an unacceptable and often illegal manner into a trash receptacle, onto the ground, or into sewers, storm drains, ponds, or streams.

7-7-2 Quantity

An estimated three million gallons of used industrial oil and over six million gallons of used motor vehicle oil are generated in Rhode Island annually. Industrial waste oil consists primarily of lubricating fluids from industrial processes. Although often high in heavy metals, industrial waste oil is burned as a heating fuel and may be utilized in the manufacture of asphalt. Most industrial waste oil is recovered by industry.

Used oil from motor vehicles also contains lead and other heavy metals, but it is, for the most part, a recyclable resource with approximately the same heat value per pound as virgin oil. It is often contained at the time of its removal from a vehicle, and requires only an accessible, environmentally sound collection system.

7-7-3 Legal Framework

RIGL §23-19.6, which defines and describes Rhode Island's policy on used oil recycling,

requires collection and recycling of used oil to the maximum extent possible, by means that are economically feasible, and environmentally sound. The stated goals are to conserve petroleum resources, preserve and enhance the quality of the environment, and protect public health and welfare.

Used oil is defined as a hazardous waste, subject to the Hazardous Waste Management Act of 1978; the Water Pollution Law, Chapter 46-12; and the Air Pollution Law, Chapter 23-23; and any subsequent regulations. Generators may choose to complete the hazardous waste manifest and follow the appropriate reporting procedures. As an alternative, the transporter may use the waste automotive oil manifest, leaving a receipt with the generator as proof of proper disposal. The manifest includes the name of the transporter, the date of the shipment, the quantity of the oil, and its destination. Waste automotive oil logs are submitted to the Department of Environmental Management monthly and the records retained for a period of three years after delivery.

7-7-4 Current Management Practices

a. Used Oil

In 1988, a program to improve the collection and recycling of waste oil was jointly launched by the DEM and participating municipalities. This program, in which 37 of the State's 39 cities and towns participate, has expanded and been sustained at a high level of activity through the years and continued to be active and very productive at the time this Plan was adopted. Residents in the Town of Johnston use the waste oil collection receptacle at the Central Landfill. The Town of Jamestown operates its own waste oil collection and recycling program. Under the program, waste oil collection containers were provided by the DEM to municipalities which repair, maintain and provide oversight of the containers.

The DEM contracts to periodically pick up the waste oil collected in the containers and deliver it to a recycler who processes it and sells it for use as fuel in industrial boilers. Since the program's inception 1,869,704 gallons of waste oil have been recovered and recycled, which is an average of nearly 125,000 gallons annually. In its first six years, the program recovered an average of 129,700 gallons of waste oil annually. In 2003, 117,721 gallons of waste oil were collected and recycled, a slight falloff but still impressively productive.

b. Used Oil Filters

The Used Oil Filter Collection and Recycling Program was launched in 1992 by the DEM and is operated in tandem with the Used Oil Program in conjunction with the 37 participating cities and towns. Since the program's inception, 1,181 drums containing a total of 236,200 oil filters have been collected by the DEM and sent to a processing facility which drains the filters of their oil and recycles the filters' components. In 2003, 31,400 used oil filters were collected and shipped to the recycling facility by DEM.

7-7-5 Actions

1. DEM should continue to operate and maintain the used oil and used oil filter programs at their existing or higher level.

7-8 HOUSEHOLD HAZARDOUS WASTE

7-8-1 Introduction

Household hazardous waste constitutes a portion of the hazardous waste stream that is unregulated by the EPA. National statistics indicate that up to 1.5 percent of municipal solid waste is household hazardous waste. Typically, household hazardous wastes include paints, solvents, thinners, pesticides, household cleaners and chemicals, swimming pool and hobby chemicals, automotive waste oil, and antifreeze.

7-8-2 Past Management Practice

Beginning in 1984, the DEM held more than 40 household hazardous waste cleanups with homeowners dropping off their waste at mobile collection points set up throughout the state. In 1995, the DEM built a permanent household hazardous waste collection facility at Fields Point in Providence, which operated for six years free of charge to homeowners. It was open to receive waste on 84 days for an average of 14 days per year, and collected 1,250,000 pounds of waste from more than 14,000 homeowners.

7-8-3 Current Management Practices

In June 2001, RIRRC assumed responsibility for household hazardous waste collection from the DEM and built the Eco-Depot, the permanent household hazardous waste collection facility at the Landfill, for a total cost of about \$240,000. The facility began operating, free of charge to users in July 2001. In order to prevent long lines of cars waiting to drop off hazardous waste, the facility operates by appointment scheduling about 28 drop-off days annually, always on Saturdays to accommodate homeowners. From June 2001 through December 2005, Eco-Depot scheduled 111 drop-off days and collected 934 tons of household hazardous waste from 23,689 users. In 2003, RIRRC initiated regional hazardous waste collection with its contractor setting up mobile collection points in the different regions of the state. Thirty regional collections were held through December 2005.

Since June of 2001, an average of 213 homeowners delivered their waste for disposal at each Eco-Depot event. The use of Eco-Depot is rising; more than 9,000 households brought their household hazardous waste to the facility during 2005. The waste collected is packaged and shipped to licensed hazardous waste disposal facilities. The Eco-Depot also has received nearly 37,000 propane tanks, which are recycled and 3,673 pounds of mercury in its first five years of operation. The cost to RIRRC for the services of its licensed contractor to operate the facility and dispose of waste from June 2001 through December 2005 was \$1,276,774. The cost of construction plus about \$100,000 annually in staff expenses and other facility overhead costs such as utilities, insurances and other costs bring the total cost to RIRRC to build and operate Eco-Depot during its first five years to approximately \$2,016,000 or about \$85.00 per user.

7-8-4 Findings

It is essential to continue to educate the public concerning the toxicity of certain household products, the danger that improperly disposed of household hazardous waste poses for the environment and how to properly dispose of such items.

7-8-5 Actions

1. RIRRC and the DEM will seek to reduce the unit cost of operating the household hazardous waste program and make it more readily available to more citizens. Therefore, beginning January 1, 2008, RIRRC and the DEM will review the regulatory requirements for the receiving and handling of materials currently classified as household hazardous waste to determine if they can be simplified and to determine if some of the materials currently classified as hazardous waste can be reclassified as universal wastes, which require simplified and less expensive handling procedures.
2. The RIRRC and the DEM should encourage municipalities to develop programs to collect universal wastes so that it is unnecessary for Eco-Depot or RIRRC to process them.¹⁰ This would make collection of universal wastes more convenient for the residents and reduce RIRRC's costs of running Eco-Depot and its computer recycling collection programs.
3. The RIRRC should continue to operate the Eco-Depot free of charge to its users and should continue to conduct its informational outreach program to educate the public concerning the dangers of household hazardous waste and how to use Eco-Depot.

7-9 ELECTRONICS

7-9-1 Introduction

One of the fastest growing types of waste in the United States is electronics, including TV's, computer monitors, mobile telephones, and other electronic equipment. According to Franklin Associates, the firm that prepares the annual characterization study of the national solid waste stream for EPA, there were about 2,260,000 tons of consumer electronics in the 229,230,000 tons of solid waste that were generated in the U.S. in 2001. With 60 million new personal computers purchased each year and 250 million computers expected to be obsolete by 2005, it is clear that the scope of the problem is staggering, a situation that is not ameliorated by the fact that only about 10 percent of all computers are recycled.

Based on the pro-rata extrapolation of national population and solid waste tonnage figures to the Rhode Island context, it is estimated that 7,000 tons of household electronics were disposed of in the Landfill in 2001. Within the context of the total Rhode Island solid waste stream, 7,000 tons is not a staggering fraction -- about 0.5 percent. However, the potential resource recovery and environmental protection benefits that can be realized by electronics recycling is significant. The typical computer monitor or TV contains four to five pounds of lead and these items account for about 40 percent of all lead in the American waste stream. In addition to lead, computers and TV's also contain chromium, cadmium, mercury, beryllium, and nickel, all of which are recoverable. Hundreds of millions of pounds of lead and cadmium and hundreds of thousands of pounds of mercury are recoverable from the

¹⁰ DEM's Universal Waste Regulations: <http://www.state.ri.us/dem/programs/benviron/assist/pdf/univrule.pdf>

computers and TV's that are landfilled annually.

7-9-2 Current Management Practices

RIRRC operates a household computer recycling program that was launched with two pilot, one-day drop-off events in Newport and Providence in 2000, the first time electronics were targeted for collection and recycling in Rhode Island. These pilot events collected 180,000 pounds of electronics, mostly computers, and were so successful they led to establishment of RIRRC's permanent Computer Recycling Program. Since the program's inception, RIRRC has conducted regional collections throughout the state as well as accept computers at the Landfill complex. A total of 1,573,000 pounds of computers and other electronic waste have been collected and recycled through June 2006 at a total cost to RIRRC of \$294,000, with \$126,000 paid to RIRRC's contractor to remove and recycle the computers and \$168,000 spent to advertise each of the collection events to ensure the public is aware of them and fully utilizes them. Various valuable metals, including lead, mercury, and cadmium are stripped from the recovered electronic components.

In 2005, NERC and the Eastern Regional Conference of the Council of State Governments began a collaborative effort to develop a unified legislative approach to the management of waste electronics in the Northeast. The goal of this project is the development of model legislation to be filed in the legislatures of the Northeastern states.

7-9-3 Findings

Against a total computer electronics annual waste stream of more than 7,500 tons, the RIRRC's program has managed to extract an average of about 76 tons of computers annually since the inception of the program.

7-9-4 Actions

1. RIRRC and the DEM should work together to implement a ban on the landfill disposal of electronics by January 1, 2008 as defined in the Glossary of Terms in Part 1 of this Plan.
2. RIRRC should explore methods of increasing the extraction of computers for recycling while decreasing the unit cost of the program.
3. RIRRC should investigate the feasibility of setting up a program on or before June 30, 2008 that would also recover old and/or surplus electronic equipment for reuse in addition to the current program of reclaiming metals from them.
4. RIRRC and the DEM should continue to cooperate with the aforementioned regional effort to develop model legislation concerning the management of waste electronics.
5. DEM and RIRRC should work together to develop a program to encourage manufacturers, distributors and retailers to adopt a product stewardship approach concerning electronics and to encourage manufacturers to assume responsibility for the management of electronics waste.

7-10 MATTRESSES

7-10-1 Introduction

RIRRC has begun to examine the cost of removing mattresses from the waste stream to prevent them from being landfilled versus the potential benefit of improved utilization of available Landfill airspace achieved by removing the mattresses.

It is estimated that tens of thousands of mattresses and box springs are disposed of annually at the Landfill and it is generally recognized that mattresses and box springs consume more than their fair share of landfill capacity because they cannot be compacted as densely as household trash. In order to test the feasibility of conserving landfill capacity by removing mattresses and box springs, the RIRRC entered into a one-year agreement effective July 1, 2005 with a mattress recycler under which the recycler was paid \$15.00 for each mattress or box spring it removed from the Landfill and transported to its facility to be shredded. According to its arrangement with RIRRC, the recycler leaves an empty trailer at the Landfill to receive mattresses delivered by RIRRC's customers that would otherwise have gone to the landfill for disposal. The recycler replaces trailers filled with mattresses and box springs with empty trailers.

7-10-2 Findings

Preliminary indications are that the program is successful and cost warranted.

7-10-3 Actions

1. RIRRC will continue to work with private industry to maintain the existing mattress recycling program and to seek to improve the program to divert as many mattresses from landfill disposal as possible.

7-11 SOLID WASTE WITH MERCURY CONTENT

7-11-1 Introduction

Mercury is a naturally occurring shiny, silver white, odorless metal that conducts electricity. It exists in gas, liquid, or solid form. It is liquid at room temperature, combines easily with other metals, and expands and contracts evenly with temperature changes. Because of these properties, mercury has many applications in the home and workplace. However, mercury in the environment can be toxic at low levels and human exposure to mercury can lead to health problems.

In 2001, Rhode Island adopted RIGL 23-24.9, the Mercury Reduction and Education Act, one of the most comprehensive laws in the nation regulating the sale, use, and disposal of elemental mercury and mercury-added items. This statute: 1) prohibits the sale or distribution of mercury-added items unless the DEM first receives notification of the product; 2) prohibits the sale of mercury-added novelty items; 3) limits the mercury content of mercury-added items; 4) requires that mercury-added items be labeled; 5) prohibits the disposal of mercury-added products except by recycling or as hazardous waste; 6) prohibits

the use of elemental mercury except for medical, dental or research reasons; and 6) requires the DEM to conduct public outreach, education and technical assistance programs.

7-11-2 Current Management Practices

In May 2004, the DEM adopted the Rules and Regulations Governing the Administration and Enforcement of the Mercury Reduction and Education Act that are designed to implement all aspects of the law. The DEM also prepares and distributes fact sheets, brochures, and other informational and educational materials concerning the statute, the hazards posed by mercury, the need to regulate mercury-added products, and regional and national activities and programs to regulate mercury-added products. The DEM also makes these data available on a mercury page that is part of the department's website.

The 14-member Commission on Mercury Reduction and Education, which was established under the law, met from May 2004 through April 2005 for the purposes of 1) evaluating methods of reducing and/or eliminating mercury hazards and their sources; 2) identifying current and projected sources of mercury hazards; 3) developing programs coordinated with efforts in other states; and 4) determining the effectiveness of educational programs and disposal and recycling activities designed for consumer use. The Commission issued its final report to the Governor in April 2005.

7-11-3 Findings

The Commission on Mercury Reduction and Education findings are summarized as follows.

Evaluation of mercury exposure and toxicity is a complex issue. While background levels of mercury in Rhode Island are significantly below federal guidelines for acceptable exposure, mercury exposure may occur either through breathing ambient air or more likely through contact with other media or food sources. Mercury persists in the environment for a very long time. Exposure to women and the impacts on their babies' developing nervous systems are the primary public health concerns associated with mercury exposure.

Mercury deposited in the state's environment comes primarily from human-made sources such as solid waste incinerators or coal-fired power plants outside the state. Mercury emissions from solid waste landfills are insignificant. The total annual mercury emissions from within Rhode Island are likely to range between 400 pounds and 1,200 pounds. The major industrial emitters of mercury in the state are hospital incinerators and wastewater treatment sludge incinerators. Mercury can also enter the environment through the disposal of mercury-added wastes and by spills and releases of elemental mercury, which are not unusual in Rhode Island. The DEM normally recovers several dozen pounds of elemental mercury annually. It is estimated that mercury emissions from Rhode Island landfills total less than one pound per year. The Commission also estimated that 43 pounds of mercury could be recovered annually from automobiles.

Mercury use in products is declining. Product labeling, the collection of mercury-containing products and public information and outreach programs are among the mercury-reducing activities in place in Rhode Island.

7-11-4 Actions

1. The DEM will review and, if appropriate, act expeditiously on the recommendations made by the Commission on Mercury Reduction and Education in its Final Report to the Governor.

171-8 ECONOMICS OF THE SYSTEM

8-1 INTRODUCTION

Since RIRRC is a fully self-sufficient autonomous State corporation, nearly all of the money necessary to conduct the research and implement the programs described in Parts 171-6 and 171-7 must be generated by the Corporation. The DEM has declared that it no longer will allocate resources to solid waste management programming beyond the regulatory programs of monitoring, enforcement of various recycling regulations, and enforcement of license conditions for solid waste management facilities. Limited amounts of grant funding may be available from federal sources such as the EPA and the private sector. However, most funding for the programs described in this Plan will derive from RIRRC's budget and the municipalities themselves.¹¹ For the most part, innovative programs and technologies for the management of solid waste are developed by RIRRC.

A number of municipalities have outstanding recycling and solid waste management programs and have made significant contributions to the advancement of recycling. For example, Warwick has invested hundreds of thousands of dollars to implement one-person automated collection trucks. Warwick's creative and entrepreneurial efforts have resulted in a very substantial reduction in its unit cost of collecting garbage and recyclables while achieving the type of recyclables diversion that is normally seen only in PAYT programs.

The Landfill is a key element of infrastructure upon which the cities and towns depend for their solid waste disposal and absent which the municipalities' solid waste disposal fees would most likely at least double. In 2005, the Landfill was available to the cities and towns at the low tipping fee of \$32.00 per ton, a rate that had been held stable for 12 years while commercial tipping fees ranged from \$50.00 to \$65.00 per ton. In fact, the municipal disposal fee has been lower than the commercial disposal fee for all of the nearly 24 years that RIRRC has owned and operated the Landfill.

In FY 2005, the last year for which complete financial data are available, RIRRC generated about \$68.5 million in total revenues with more than \$55 million derived from landfill operations, nearly \$7.5 million in recycling revenue, and the balance from other sources including interest income. RIRRC's operating expenses for FY 2005 totaled about \$57.3 million with the cost of operating the Landfill and its related facilities, the MRF, the C&D processing facility, the Tipping Facility, the maintenance facility, and the scale houses. Landfill closure and post-closure costs mandated by the EPA and the DEM totaled approximately \$14.3 million for FY 2005. Host community costs for the year were \$3.5 million. Since 1995, the General Assembly, via the State's annual budget, has directed that more than \$43 million be transferred from the RIRRC to the State General Fund through FY 2005. ~~Ironically, t~~

¹¹ A detailed discussion of the economics of certain aspects of solid waste management and in particular PAYT is contained in the Final Report by the Economics Sub-Committee of the Comprehensive Plan Working Group.

The reliance on commercial sector tipping fee revenue for funding waste diversion programs, municipal disposal fee subsidies, and contributions to the State's General Treasury, may contribute to an earlier than optimal exhaustion of the remaining landfill capacity. It must be recognized that disposal capacity used by the commercial sector today will not be available for the municipal sector in the future.

8-2 PROJECTED COSTS FOR SOLID WASTE MANAGEMENT SYSTEM

The programs and facilities managed by the RIRRC are not only directly affected by this Plan, they also form the foundation for virtually all of the solid waste management activities discussed in the Plan. The two major cost centers for RIRRC are the Landfill and the MRF, although there are other costs for such things as recycling and waste prevention activities and the public education efforts designed to heighten the public's awareness of recycling and waste prevention. The major cost categories are described below, along with a general sense of the magnitude of the current costs in each category.

8-2-1 Direct Landfill Costs

The following costs are based on the actual costs incurred for the fiscal year ended June 30, 2005 and are considered to be reasonably reflective of future costs. The FY 2005 costs have not been adjusted for inflation.

Personnel Costs: All personnel costs, including benefits, associated with RIRRC personnel that actually operate the Landfill facilities, including the Tipping Facility, the C&D Processing Facility, the Leachate Pre-treatment Facility; the maintenance facility, the scale houses, and the Landfill itself, but excluding the MRF and the administrative offices are included in this cost category. FY 2005 costs were approximately \$7.5 million.

Operation and Maintenance Costs: All costs associated with the operation and maintenance of the Landfill and Landfill-related facilities, are included in this category. These costs include, among other things, temporary labor, lab-testing fees, engineering costs, insurance, subcontractors, materials, permitting fees, fuel and electricity for buildings and equipment, and repairs and maintenance. For FY 2005, these costs totaled approximately \$16,000,000.

Depreciation, Depletion, and Amortization: Property, plant, and equipment used in primary operations are stated at cost. Ordinary maintenance and repair expenses are charged directly to operations as incurred. Depreciation and amortization are computed using the straight-line method over the estimated useful lives of the respective assets. The cost of the licensed landfill and land improvements is being depleted over the estimated useful capacity of the respective sites.

Land acquired through eminent domain and intended for development is stated at the lower of cost or fair value. Land acquired through eminent domain and intended for resale is stated at the lower of cost or net realizable value. The cost of property acquired

through eminent domain not intended for development or resale is being amortized over the estimated life of the currently licensed landfill. Property acquired for possible siting of future landfills, including costs incurred to ready such property for intended use, is recorded at cost until such time as licensure is obtained. If licensure is denied, the costs will be charged to operations. FY 2005 depreciation, depletion, and amortization costs totaled approximately \$10.6 million.

Interest Expense: During January 2002, RIRRC issued Resource Recovery System Revenue Bonds, 2002 Series A (the Bonds), in the aggregate principal amount of \$19,945,000. The Bond proceeds were used to finance the construction and equipping of a tipping facility to receive and handle all commercial and municipal solid waste delivered to the facility. These bonds bear interest at rates that range from 3.5 % to 5% and mature in varying installments beginning March 1, 2003 through March 1, 2022. The outstanding indebtedness is subject to optional and mandatory redemption provisions. Mandatory redemption is required on bonds over various years beginning in 2018 through 2022 at the principal amount of the bonds. Certain Bonds may be redeemed early, at the option of the Corporation, at amounts ranging from 97% to 100% of the principal balance. The principal amount outstanding at June 30, 2005, totals \$16,876,881.

FY 2005 interest costs totaled \$960,245.

Landfill Closure and Post-closure Care Costs, and Superfund Clean-up Costs: the EPA established closure and post-closure care requirements for municipal solid waste landfills as a condition for the right to operate them. Amounts provided for closure and post-closure care is based on current costs. These costs are updated (adjusted) annually due to changes in the closure and post-closure care plan, inflation or deflation, technology, or applicable laws or regulations. RIRRC recognizes an expense and a liability for these costs based on landfill capacity used to date. As of June 30, 2005, the Corporation had placed approximately \$24,079,000 into the Phases II & III, IV and V trust funds for closure and post-closure care costs. During 1996, RIRRC entered into a Consent Decree with the EPA concerning remedial actions taken by RIRRC for groundwater contamination. The Consent Decree, which was approved by the U.S. District Court on October 2, 1996, requires the establishment of a trust fund in the amount of \$27,000,000 for remedial purposes. The Phase I trust fund balance as of June 30, 2005, net of disbursements, for remediation totaled approximately \$36,243,000. RIRRC will continue to fund the trust funds on an annual basis in order to satisfy the above-mentioned the EPA requirements. Trust fund contributions are expected to approximate \$4,000,000 annually. The FY 2005 provision for closure and post-closure care costs and Superfund clean-up costs totaled approximately \$14,313,467.

Host Community Costs: Payments and amounts due under the RIRRC'S agreement with its host community, Johnston, for the year ended June 30, 2005 were approximately \$3,750,000.

Interest Income: There are a number of funds, including those for post-closure costs, that have been established. These funds bear interest until such time as the money is utilized

for its intended purpose. In FY 2005, interest and investment revenue totaled \$3,472,000.

Methane Royalty: In exchange for allowing a private company to utilize the methane generated at the Landfill for the generation of electricity, RIRRC receives a royalty payment. The projected royalty payments are reflected in this category, which accounts for more than \$1.2 million in income.

8-2-2 Other Landfill Costs

The value of the Landfill's disposal capacity is directly affected by the fact that it is a non-renewable and diminishing resource, therefore it is important that the users of the Landfill recognize the true economic value of its capacity. The Landfill's users need to recognize the *opportunity cost* of consuming disposal capacity today which otherwise would be available in the future. Such costs are in addition to the direct cost of building and operating the landfill found on the RIRRC financial statements. One measure of the value of landfill capacity, assuming that the private sector managers price disposal capacity at its estimated value, is the regional market price; currently estimated to be ~~\$6055~~-\$70 per ton.

In addition to the direct costs associated with operating the landfill and the opportunity cost associated with consuming its capacity, there are costs to society that are not recognized on financial statements or by disposal markets. These costs, known to economists as external costs, arise from factors such as litter, air pollution, the risk of potential ground water contamination, and various other environmental and social impacts. While pollution abatement and environmental protection efforts at the Landfill continue to expand (see Section 6-5-3), there will always be some degree of air pollution emissions and the risk of some future ground water contamination associated with the operation of any landfill. Quantification of such external costs is difficult but not impossible. Certainly, it behooves policy-makers to recognize the existence of such costs and where possible obtain estimates of the magnitude of external costs associated with the Landfill.

8-2-3 Recycling Costs

Cost of Operating the MRF: The cost of operating the MRF in FY 2005 was about \$3.4 million.

Recycling Staff: Includes labor costs and fringe benefits for all the RIRRC staff involved in the administration of its waste prevention and recycling programs and MRF operations. This cost is currently approximately \$819,000 per year.

Depreciation: See discussion of depreciation for Landfill.

General and Administrative: See discussion of G & A costs for Landfill.

Interest: See discussion of interest for Landfill.

Revenue Share/Grants: RIRRC expects to continue to subsidize the incremental costs of recyclables collection borne by municipalities beyond the period in which it is mandated

to do so. These subsidies would be through some form of revenue sharing or grants.

Material Revenue: The sale of recyclables generates considerable revenue that offsets some of the costs of the recycling program. Since each of the recyclables handled at the MRF is a commodity, and the prices for these commodities vary substantially over time, it is difficult to project material revenues with a high degree of precision. This is particularly true because both the mix of materials and the nature of the marketplace for those materials is somewhat uncertain. Given this uncertainty, material revenues between \$4.5 and \$6.5 million per year can be reasonably expected, with revenue levels outside of that range possible.

8-2-4 Total Costs

Given the uncertainty in many of the cost and revenue categories described above, the range of possible total costs is rather large. However, in the next few years it is likely that total operating costs, including depreciation, amortization, and depletion for RIRRC-sponsored facilities and programs will be between \$55 and \$65 million per year.

8-2-5 Projected Capital Costs

The following capital costs were incurred in Fiscal Year 2005 and in the five-year period immediately thereafter can all be assigned to landfill operations with the exception of the two-million dollar project to modernize processing equipment in the MRF with state-of-the-art machinery:

a. C&D Processing Facility

The RIRRC built and brought into operation in FY 2005 a pre-engineered steel building for the purposes of grinding C&D to be used as an alternative daily landfill cover material. This facility, whose total engineering and construction cost was about \$2.5 million, is located north of the MRF and east of the Tipping Facility and replaces the RIRRC's C&D processing operation that was conducted for several years at the former Macera transfer station on Plainfield Pike in Cranston.

b. Leachate Pre-Treatment Facility

As the footprint of the Landfill that is equipped with geo-membrane and clay liners and leachate collection systems expands so does the volume of leachate that is generated by the Landfill. In order to keep pace with the increasing volume of leachate and to improve the treatment process, RIRRC spent an estimated \$500,000 in 2005 to retrofit the pre-treatment facility with new equipment that will increase its capacity to 400,000 gallons of leachate per day. In 2005, the facility was treating about 200,000 gallons of leachate daily.

c. The Phase V Landfill

The 32-acre Phase V Landfill, which adjoins Phase I along its southern and southeastern slopes, was licensed in May 2004. With projected life ranging from 6.67 years to 8.83 years depending upon the amount of waste diverted from disposal, the 7.52 million ton facility will cost an estimated \$24 million to design and construct. Relocation of Cedar Swamp Brook to accommodate Phase V cost about \$7 million and design and construction of Phase V will

cost an estimated \$17 million. Construction of Area 1A, Phase V was completed in July 2004 and trash placement began in September 2004; construction of Area 1B was completed in November 2004 and trash placement began in February 2005. Construction of Area 2, Phase V began in the Spring of 2006.

d. The Phase VI Landfill

The first stage of the proposed Phase VI landfill, would be located to the east of Phase I in the general area of the Ridgewood Power landfill gas electric generating station and would piggyback up the east slope. RIRRC has not completed its cost studies with respect to the possible relocation of the power plant, tipping facility, Recovermat facility, administration building, and-or the construction of the Phase VI baseliner, but funding for design and preliminary site work for Phase VI would be needed in 2008 given current rates of landfill loading. Very rough estimates for the cost of relocating existing facilities in the event of eastern expansion of the landfill are as follows:

<u>power plant</u>	<u>\$10M</u>
<u>tipping facility</u>	<u>\$14M</u>
<u>Recovermat facility</u>	<u>\$2.3M</u>
<u>administration building</u>	<u>\$12M</u>

e. The Phase I Cap

This project will complete the installation of the landfill cap for the Phase I Landfill as required by RCRA. Phase I has a 121-acre footprint and is that portion of the facility that was licensed and active when the RIRRC purchased the Landfill from the Silvestri Brothers in December 1980. The Phase I cap covers a total of 54 acres and was completed in November 2005, at a total estimated cost of \$11.7 million.

f. MRF Process Train Upgrade

The MRF's materials processing system has been redesigned and the old and worn-out processing equipment was replaced in July 2005 at a total cost of \$2.8 million, enabling the facility to process more material faster with a smaller labor force.

g. New I-295 Interchange

In order to provide a shorter and more direct route to the Landfill, RIRRC funded the planning, design, and construction of a new diamond interchange at I-295 and Scituate Avenue, which was completed in October 2003 at a total cost of approximately \$10 million. The new interchange will divert 50 to 75 percent of the trash truck traffic from Plainfield Pike to Scituate Avenue and Shun Pike, reducing the distance to the Landfill from I-295 from an average of 2.75 miles to about one mile, thus reducing fuel consumption and air emissions.

h. Upgrade of Scituate Avenue and Shun Pike

To accommodate the sharp increase in heavy truck traffic on Scituate Avenue and Shun Pike

that will be generated by the new ramps, the RIRRC funded the widening of these roads from two to four lanes at a total cost estimated to be about \$2.5 million. This project was completed in FY 2005.

8-2-6 Financing the System

The primary means by which the solid waste management system will be financed is by Landfill tipping fees. Although the MRF generates significant levels of revenue in some years, a stable revenue flow from the MRF cannot be counted on because of the intensely volatile nature of markets for recyclables. Therefore, it is anticipated that the vast majority of the net costs identified in Section 171-8-2 will be covered through Landfill tipping fees.

Currently, the major source of RIRRC tip fee revenue is the commercial sector. In fact, while the municipal tip fee revenue may cover the direct cost of disposing municipal sector waste, it is this commercial sector tip fee revenue that has been used to fund RIRRC waste diversion programs and grants, as well as contributions to the State's General Fund. This reliance on commercial sector revenues may result in an earlier than optimal depletion of the landfill resource. In short, there is a trade-off associated with utilizing landfill capacity as a source of short-term funding.

~~Arguably, the simplest mechanism to reduce the amount of waste disposed at the Central Landfill is to raise the commercial solid waste tip fee to a point where a significant share of Rhode Island's commercial sector waste is either reduced and diverted to recycling by generators, or as is more likely, exported to out-of-state disposal facilities by private haulers. Given the dwindling supply of disposal capacity in New England, the most likely destination for the bulk of Rhode Island waste exports would be southeast and mid-western states. Presumably, those private haulers best suited to transport large quantities of solid waste long distances, and who can secure inexpensive disposal capacity out of state, would be the first commercial customers to reduce their disposal at the Central Landfill in response to such an increase in tip fees^[K2].—One option is to increase the commercial tipping fee to a point where exporting waste to out-of-state locations becomes economically attractive to haulers.~~ Under such a scenario, tip fee revenue on a per ton basis, and therefore the total revenue over the life of the landfill, will increase. However, given a large enough increase in commercial tip fees, short-term revenue needed to support RIRRC budget obligations in any given period will decrease.

The impact of exporting a major share of commercial waste from Rhode Island on landfill life is significant. Assuming the recommendations in this Plan are implemented and the diversion assumptions of in Part V are achieved, the expected life of the Landfill through the proposed Phase VI is the year 2031. If in addition to diverting 25 percent of commercial sector waste, 50 percent of the disposed commercial sector waste (approximately 245,000 tons per year) was exported to out-of-state disposal facilities, the remaining Landfill life available for municipal sector disposal could be extended by nine years to the year 2040 ~~(assuming a 100 percent export rate, the Landfill life could be extended to 2057)~~. This represents ~~nine additional~~ years of low-cost, reliable, in-state solid waste disposal available to municipalities. However, the trade-off under this export scenario is a reduction in annual RIRRC operating revenues in the range of \$7M to \$12M per year.

Setting of the commercial solid waste tip fees must be undertaken with some caution. If the rate is set too high, RIRRC may be left with insufficient funds to meet its operating, debt service, and closure funding obligations. Conversely, if the rate is set below the market rate the Corporation will forego operating revenues and deplete the remaining landfill capacity at a faster than optimal rate. ~~Presumably, there is an optimal commercial solid waste price and associated rate of local landfill capacity depletion that will support all of the state's municipal sector disposal needs and some optimal share of the commercial sector solid waste.~~

It is likely that the cost of exporting and disposing solid waste out of Rhode Island is between \$55 and ~~\$65-70~~ per ton, or even more. This cost is certainly a reflection of the regional solid waste disposal market rates. In fact, Massachusetts reports an increasing reliance on exportation of solid waste (more than 1.8m tons of MSW and C&D in 2004). While there are a number of sources that cite disposal fees in New England in excess of \$75 per ton, they primarily rely on "gate rate" prices and overestimate the true disposal market price. More research into these markets is certainly warranted at this time in order to guide the disposal fee setting process.

8-2-7 Actions

The following are actions regarding financial policy that can support the goals and objectives of the Plan:

1. RIRRC will maintain a zero tipping fee for municipal recyclables delivered to the MRF, to the extent it remains consistent with financial solvency, in order to maximize the financial incentive to recycle. Commercial recyclables shall also be processed tipping fee free at the MRF subject to the conditions set forth in Actions 6-4-2-~~6e~~ (5); 6-4-4-~~4d~~ (3) and 6-4-9e-2[K3].
2. It is recommended that the General Assembly should not divert funds from the RIRRC to the State General Fund because fund diversion weakens the RIRRC'S ability to mount the most aggressive and advanced waste prevention, recycling, and landfill utilization programs available.
3. RIRRC shall periodically report on the prevalent market prices for solid waste disposal capacity in the Northeast and nationwide. The market report will be drafted by RIRRC staff and shall include a representative sampling of data concerning the all-inclusive costs of rail transport to, and disposal at, out-of-state landfills.
4. The RIRRC shall report on the economics of managing solid waste in Rhode Island, to include: 1) a determination of the solid waste disposal opportunity costs; 2) the value of the Landfill's capacity discounted for each year of this Plan's duration; 3) an estimate of the gross and per-ton cost of siting and developing new landfill capacity in Rhode Island other than on RIRRC'S Johnston complex to replace the Landfill; and 4) quantification of the external costs, as discussed but not limited to those referred to in Section 8-2-6, Findings. The economics study shall be performed by an independent consultant procured by ~~RIRRC~~the Department of Administration.
5. In setting commercial tipping fees, RIRRC will continue to consider:

- the urgent need to maximize the life of the Landfill;
- the economic value of the Landfill's capacity and the per-ton cost of replacing the Landfill as set forth in Action 3 above;
- the relationship between its tipping fees, the cost of other disposal options, and the quantity of waste it receives;
- the need to generate revenues sufficient to keep the RIRRC financially solvent;
- the need to fund programs, facilities, and activities recommended in this Plan; and,
- the need to provide cost-effective disposal for Rhode Island's businesses.

APPENDIX A

STATEWIDE RESOURCE RECOVERY SYSTEM DEVELOPMENT PLAN

1. **AUTHORITY.** The Statewide Resource Recovery System Development Plan (SDP) is required by RIGL §23-19-11(1).
2. **PURPOSES.** The purposes of the SDP are:
 - a) to establish, for the purposes of planning by the RIRRC:
 - 1) the annual per capita generation rates for municipal and commercial solid waste by the state and each of its municipalities;
 - 2) the baseline data for the generation of municipal and commercial solid waste in tons per year by the state and each of its municipalities;
 - 3) the official solid waste data base for the state and for the system operated by RIRRC;
 - 4) the data base which the RIRRC will utilize to determine the wastesheds for each of its facilities, if appropriate;
 - 5) 20-year projections of the amounts of solid waste within the state and each of its municipalities that must be managed on an annual basis out to the 20-year planning horizon based on a range of standard variable factors, such as, population, employment, and waste generation change rates, taking into account municipal and commercial recycling and waste prevention rates;
 - 6) indicate the location, type, and size of solid waste management facilities needed for the state's integrated solid waste management system, if appropriate and possible;
 - 7) ensure that all aspects of planning, zoning, population estimates, engineering, economics, need, service area, timing, geography, environmental and health issues are considered in planning programs or facilities;
 - 8) limit the use of landfills, maximize waste prevention and recycling, include composting of yard waste and other organics, and pursue the development of new uses for recovered recyclables to maximize revenue from recycled materials.
 - b) utilize the data base established by RIRRC and the methodology, as amended from time to time, outlined in Part 171-5, Projections of Waste Quantities, of the Plan to plan the appropriate size, number, type, mix, and location, if appropriate, of the facilities, systems, and programs for the management of solid waste in the state; and
 - c) assess annually the effectiveness of its facilities, systems, and programs in tonnage removal and economic terms.
3. **SUPERSEDES.** This Appendix and the data, analyses, methodologies, findings, conclusions, facility and program discussions contained in this Comprehensive Plan supersede the November 1996 Statewide Resource Recovery System Development Plan, effective December 6, 2005.

4. **REFERENCE DATA.**

See Parts 171-3 through 171-8 of the Plan.

5. **SYSTEM, PROJECT AND PROGRAM ANALYSES.**

See Parts 171-5 through 171-8 of the Plan.

6. **FINDINGS/CONCLUSIONS.**

See Parts 171-1, 2, 6, 7 and 8 of the Plan.

7. **FACILITY/PROGRAM TECHNICAL AND ECONOMIC DISCUSSIONS.**

See Parts 171-6, 7 and 8 of the Plan.

8. **EFFECTIVE DATE.** _____

APPENDIX B

Proposed Municipal Cap Calculation Procedure

The following procedure should be used annually by April 30th to calculate the Municipal Solid Waste Cap allocation, as directed by RIGL § 23-19-13(g)(3), based on the previous Calendar year's waste generation and population estimates which are to be applied to the coming fiscal year's municipal caps.

1. Obtain the **population estimate** for each municipality from the Rhode Island Department of Administration Statewide Planning Programs (SPP) official Population Projection (see RI State Planning Program Technical Paper 154, which may be found at www.planning.gov). For those years falling between five-year projection intervals a linear extrapolation between the five-year projections should be calculated. Also, when the next decennial census is available, the SPP Population projections should be adjusted accordingly to reflect the newer census count until newer SPP population projections are available (this will presumably occur in 2011).
2. Calculate total statewide **municipal sector waste generation** by totaling all solid waste, and recyclables (i.e., refuse, MRF recyclables, yard debris, scrap metal/white goods, tires, etc.) as reported annually on a calendar year basis by municipalities to RIRRC. (**Note:** Westerly over cap solid waste should be considered Commercial sector even if it is tipped under the municipal category.)
3. Calculate annual per capita waste generation rate by dividing the **municipal sector waste generation** by the **total municipal population projection** for the corresponding calendar year to get the **annual per capita waste generation rate**.
4. Calculate each municipality's waste generation by multiplying the municipality's **population projection** (as defined in step 1) for the calendar year, in which the fiscal cap year begins, by the **assumed residential per capita waste generation** to obtain **calculated residential waste generation**.
5. Adjust the calculated residential waste generation by the municipal cap recycling reduction as determined by RIRRC Policy to obtain the municipal cap allocation.